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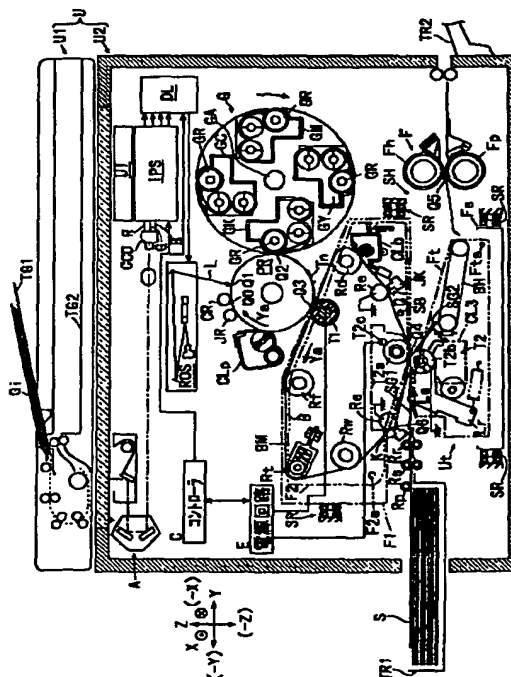
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(54) 【発明の名称】 画像形成装置

(57) 【要約】

【課題】 2次転写時のトナーを転写する部分とトナーを転写しない非画像部分との電位差を小さくして、転写電界の非画像部への広がりを防止すること。

【解決手段】 表面にトナー像が形成された像担持体P Rと、光が照射された時に抵抗値が低下する光導電性物質を含有し光が照射されていない状態では高抵抗の誘電体である中間転写体Bと、像担持体P R上のトナー像を中間転写体B上に1次転写する1次転写器T1と、除電領域Q7を通過する中間転写体Bを光照射により除電する光照射除電器J Kと、2次転写領域Q4において前記1次転写トナー像を前記記録用シートSに2次転写する2次転写器T2と、定着領域Q5を通過する記録用シートS上の2次転写トナー像を定着する定着装置Fと、電位調整領域Q6において中間転写体B上の電位を調整する中間転写体電位調整器Kとから構成される画像形成装置。



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【特許請求の範囲】

【請求項1】 次の要件(A01)～(A08)を備えたことを特徴とする画像形成装置、(A01)帯電領域、潜像形成位置、現像領域、および1次転写領域を順次通過して回転移動するとともに、前記帯電領域通過時に帯電され、潜像形成位置通過時に静電潜像が形成され、現像領域通過時にトナー像が形成される表面を有する像担持体、(A02)前記1次転写領域、電位調整領域、2次転写領域および除電領域を順次通過して回転移動する中間転写体であって、光が照射された時に抵抗値が低下する光導電性物質を含有し光が照射されていない状態では高抵抗の誘電体である前記中間転写体、(A03)給紙トレイに收容された記録用シートを前記2次転写領域、定着領域およびシート排出部に順次搬送するシート搬送装置、(A04)前記1次転写領域において像担持体上のトナー像を中間転写体上に1次転写する1次転写器、(A05)前記2次転写領域において中間転写体上の1次転写トナー像を前記記録用シートに2次転写する2次転写器、(A06)前記除電領域を通過する中間転写体を光照射により除電する光照射除電器、(A07)前記定着領域を通過する記録用シート上の2次転写トナー像を定着する定着装置、(A08)前記電位調整領域において中間転写体上の電位を調整する中間転写体電位調整器。

【請求項2】 次の要件(B01)～(B09)を備えたことを特徴とする画像形成装置、(B01)帯電領域、潜像形成位置、現像領域、および1次転写領域を順次通過して回転移動するとともに、前記帯電領域通過時に帯電され、潜像形成位置通過時に静電潜像が形成され、現像領域通過時にトナー像が形成される表面を有する像担持体、(B02)前記1次転写領域、電位調整領域、2次転写領域および除電領域を順次通過して回転移動する中間転写体であって、光が照射された時に抵抗値が低下する光導電性物質を含有し光が照射されていない状態では高抵抗の誘電体である前記中間転写体、(B03)給紙トレイに收容された記録用シートを前記2次転写領域、定着領域およびシート排出部に順次搬送するシート搬送装置、(B04)前記1次転写領域において像担持体上のトナー像を中間転写体上に1次転写する1次転写器、(B05)前記除電領域を通過する中間転写体を光照射により除電する光照射除電器、(B06)前記2次転写領域において中間転写体上の1次転写トナー像を前記記録用シートに2次転写する2次転写器、(B07)前記定着領域を通過する記録用シート上の2次転写トナー像を定着する定着装置、(B08)前記中間転写体の移動経路上に設定された電位調整領域において中間転写体上の電位を調整する中間転写体電位調整器、(B09)前記1次転写が行われる度に前記電位調整を実行する電位調整器制御手段。

【発明の詳細な説明】

【0001】

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【発明の属する技術分野】本発明は、複写機、ファクシミリ、プリンタ等の電子写真方式を用いた画像形成装置に関し、特に、像担持体上に形成したトナー像を中間転写体に1次転写し、前記中間転写体上の1次転写トナーを記録用シートに2次転写するように構成した画像形成装置に関する。

【0002】

【従来の技術】電子写真複写機等のカラー画像形成装置における画像形成方法(転写方法)としては、感光体ドラム等の像担持体上に形成されたトナー像(現像像)を一旦転写用紙以外の中間転写体上に1次転写した後、あらためて転写用紙上へ2次転写して複写像を得る方法が知られている。そしてこの方法を用いることで、転写用紙の保持状態、転写用紙の厚さやこし、転写用紙の表面性等多くの要因による、多重転写不良やカラーレジストレーションのズレの発生を抑制できることが知られている。前記中間転写体を使用した画像形成装置として、例えば次の従来技術(J01)が知られている。

【0003】(J01)図8に示す技術

図8は中間転写体を使用した従来の画像形成装置の説明図である。図8において、画像形成装置Uは、自動原稿搬送装置U1とこれを支持するブラテンガラスPGを有する画像形成装置本体(複写機)U2とを備えている。前記自動原稿搬送装置U1は、複写しようとする複数の原稿Giが重ねて載置される原稿給紙トレイTG1と、原稿給紙トレイTG1から前記ブラテンガラスPG上の複写位置(原稿読取位置)を通過して搬送される原稿Giが排出される原稿排紙トレイTG2とを有している。前記画像形成装置本体U2は、ユーザがコピースタート等の作動指令信号を入力操作するUI(ユーザインタフェース)、露光光学系A等を有している。前記自動原稿搬送装置U2でブラテンガラスPG搬送される原稿または手動でブラテンガラスPG上に置かれた原稿(図示せず)からの反射光は、前記露光光学系Aを介して、CCD(固体撮像素子)でR(赤)、G(緑)、B(青)の電気信号に変換される。IPS(イメージプロセッシングシステム)は、前記RGBの電気信号をK(黒)、Y(イエロー)、M(マゼンタ)、C(シアン)の画像データに変換して一時的に記憶し、前記画像データを所定のタイミングでレーザ駆動回路DLに出力する。

【0004】矢印Ya方向に回転移動する像担持体(感光体ドラム)PRの表面は、帯電領域Q0において帯電器CRにより一様に帯電され、潜像形成位置Q1、現像領域Q2、および1次転写領域Q3を順次通過する。前記レーザ駆動回路DLにより駆動されるROS(潜像書込装置)は、レーザビームLにより前記潜像形成位置Q1において露光走査し像担持体PR表面に静電潜像を形成する。フルカラー画像を形成する場合は、K(黒)、Y(イエロー)、M(マゼンタ)、C(シアン)の4色の画像に対応した静電潜像が順次形成され、モノクロ画像

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の場合はK（黒）画像に対応した静電潜像のみが形成される。

【0005】前記静電潜像が形成された像担持体PR表面は回転移動して現像領域Q2、1次転写領域Q3を順次通過する。ロータリ式の現像装置Gは、回転軸GAの回転に伴って前記現像領域Q2に順次回転移動するK（黒）、Y（イエロー）、M（マゼンタ）、C（シアン）の4色の現像器GK、GY、GM、GCを有している。前記各色の現像器GK、GY、GM、GCは、前記現像領域Q2に現像剤を搬送する現像ロールGRを有しており、10 現像領域Q2を通過する像担持体PR上の静電潜像をトナー像Tnに現像する。現像剤としては例えば、トナーおよびキャリアを有する2成分現像剤が使用され、イエロー、マゼンタ、シアン、黒のトナーとしては負極帯電性のトナーが使用されている。

【0006】前記像担持体PRの下方には左右一対のスライドレールSR、SRによりスライドフレームF1（2点鎖線で表示）が前後（紙面に垂直な方向）にスライド移動可能に支持されている。スライドフレームF1にはベルトモジュールBMのベルトフレームF2がヒンジ軸 20 F2a周りに上下に回転可能に支持されている。前記ベルトモジュールBMは、前記中間転写ベルト（ベルト状の中間転写体）Bを回転移動可能に支持する複数のベルト支持ロール（Rd、Rt、Rw、Rf、T2a）と、1次転写ロールT1と、それらを支持する前記ベルトフレームF2とを有している。前記複数のベルト支持ロール（Rd、Rt、Rw、Rf、T2a）は、ベルト駆動ロールRd、テンションロールRt、ウォーキングロールRw、アイドルロール（フリーロール）RfおよびバックアップロールT2aを含んでいる。

【0007】前記1次転写器T1は、コントローラCが制御する電源回路Eによりトナーの帯電極性と逆極性の転写電圧が印加され、前記像担持体PR表面のトナー像Tnを、1次転写領域Q3において中間転写ベルトBに1次転写する。フルカラー画像の場合、像担持体PR表面に順次形成される各色のトナー像Tnは、前記1次転写領域Q3において中間転写ベルトB表面に順次重ねて1次転写され、最終的にフルカラーの多重トナー像が中間転写ベルトB上に形成される。単色のモノカラー画像を形成する場合には1個の現像器のみを使用し、単色トナー像が中間転写ベルトB上に1次転写される。1次転写後、像担持体PR表面は、残留トナーが像担持体クリーナCLpによりクリーニングされ、像担持体除電器JRにより除電される。

【0008】前記バックアップロールT2aの下方には、左右一対のスライドレールSR、SRにより前後（紙面に垂直な方向）にスライド移動可能な2次転写スライドフレームFsが、画像形成装置本体に対して着脱可能に支持されている。前記2次転写スライドフレームFsによりヒンジ軸Fta周りに上下に回転可能に支持された2次 50

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転写ユニットUtの2次転写昇降フレームFtは、上昇した使用位置および下降した退避位置の間で昇降可能である。前記2次転写ユニットUtは、2次転写ロールT2bと、2次転写ロールクリーナCL3と、ロール支持レバーLrと、転写後シートガイドSG2と、シート搬送ベルトBHと、それらを支持する前記2次転写昇降フレームFtと、を有している。

【0009】前記ロール支持レバーLrは、前記2次転写ロールT2bを支持するレバーである。前記2次転写ユニットUtが前記使用位置に移動した状態において、前記ロール支持レバーLrは、図示しないモータによりヒンジ軸La周りに回転され、前記2次転写ロールT2bを、前記中間転写ベルトBに接触する2次転写位置および中間転写ベルトBから離れた待機位置の間で移動させる。前記2次転写ロールT2bおよび前記中間転写ベルトBの接触領域により2次転写領域Q4が形成され、前記2次転写ロールT2b、前記バックアップロールT2a、およびバックアップロールT2aに当接する金属製の電極ロールT2cにより2次転写器T2が構成されている。

【0010】給紙トレイTR1に収容された記録シートSは、所定のタイミングでピックアップロールRpにより取り出され、さばきロールRsで1枚ずつ分離されて、レジロールRrに搬送される。前記レジロールRrに搬送された記録シートSは、前記1次転写された多重トナー像または単色トナー像が2次転写領域Q4に移動するのにタイミングを合わせて、転写前シートガイドSG1から2次転写領域Q4に搬送される。前記2次転写領域Q4を記録シートSが通過する際、2次転写器T2の電極ロールT2cには、コントローラCが制御する電源回路E 30 からトナーの帯電極性と同極性の2次転写電圧が印加される。前記2次転写器T2は、前記中間転写ベルトBに重ねて1次転写されたカラートナー像を前記2次転写領域において一括して記録シートSに2次転写する。2次転写後の中間転写ベルトBはベルトクリーナCLbにより残留トナーが除去される。また、前記2次転写ロールT2bは2次転写ロールクリーナCL3により表面付着トナーが回収される。

【0011】なお、前記2次転写ロールT2bおよびベルトクリーナCLbは、中間転写ベルトBに対して離接（離隔および接触）自在に配設されており、カラー画像が形成される場合には最終色の未定着トナー像が中間転写ベルトBに1次転写されるまで、中間転写ベルトBから離隔している。トナー像が2次転写された前記記録シートSは、転写後シートガイドSG2、シート搬送ベルトBHにより定着領域Q5に搬送され、定着領域Q5を通過する際に加熱ロールFhおよび加圧ロールFpにより構成される一対の定着ロールを有する定着装置Fにより加熱定着される。トナー像が定着された記録シートSは、記録シート排出トレイTR2に排出される。前記符号Rp、Rs、Rr、SG1、SG2、BHで示された要素によりシー

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ト搬送装置 SH が構成されている。

【0012】

【発明が解決しようとする課題】（前記従来技術（J01）の問題点）前記従来技術（J01）の中間転写体を用いた画像形成装置において、その中間転写体にはこれまで高分子材料中にカーボンや金属化合物などのフィラーを導電剤として分散させたものなどが用いられている（特開平 8-320622 号公報参照）。しかし、このように形成された中間転写体の抵抗とトナー像の画質には密接な関係があることが知られており、抵抗値が低すぎると、転写時のトナーの飛び散りが著しく発生し画質が低下する（特開平 08-248779 号公報参照）。中間転写体の抵抗値が低すぎる場合、1 次転写ロールによる転写電界と転写電流の作用で、トナー層のない領域に転写電界がかかりやすくなるために転写領域が広がり、その作用によってトナーが飛び散って転写されてしまうためと考えられる。

【0013】また中間転写体の抵抗値が高い場合、さらには誘電体などの場合には、トナー画像領域における中間転写体の電荷保持性が増加し、転写に必要な電界を適切にトナーへ印加することができる。一方、隣接する非画像部の中間転写体表面および内部の電荷移動は減少する為、1 次及び 2 次転写においてこの領域へのトナー転写が起こり難くなる。このことにより中間転写体の抵抗値が高い場合、さらには誘電体などの場合には、トナーの飛び散りが少なく良好な画質のトナー形成像が得られる。しかし、この場合はトナー転写後に電荷が中間転写体に蓄積するため、そのままでは次の画像形成時に悪影響を及ぼしてしまう。また、中間転写体の平均的な抵抗値が良好な抵抗値幅にあったとしても、次のような問題点が挙げられる。すなわちカーボンや金属化合物などのフィラーを高分子樹脂に分散した場合には、フィラーの分散状態に起因する中間転写体内の抵抗バラツキが約 1 桁以上と大きいこと、フィラーとフィラー間の微少な高分子樹脂部の絶縁破壊や通電によるフィラーの再配列などによる中間転写体の低抵抗化が経時で起こることなどである。このように、中間転写体の抵抗が、部分的に或いは全体的に良好な抵抗値幅から外れ、画像品質を著しく低下させるという問題があった。

【0014】そこで我々は特願平 10-123999 号（特開平 号公報）で光導電性を有する中間転写体を提案した。これは従来のカーボンブラックなどの導電粉を分散した中抵抗の中間転写体とは異なり、第 1 及び 2 次転写時には誘電体としての高抵抗を有している。このため第 1 及び 2 次転写時に電界が広がることなく良好な画像を得ることができるものである。そして第 1 及び 2 次転写後にはそれぞれ転写電界によって中間転写体上に電荷が蓄積されるが、2 次転写後に中間転写体上に光照射することで、非接触に且つオゾンなどを発生することなく電荷を除電することができるもの

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である。

【0015】図 9 は前記特願平 10-123999 号（特開平 号公報）のような高抵抗の光導電性中間転写体を使用して、像担持体（感光体）から中間転写体にトナー像を転写する場合のトナー像およびその周囲の電位を示す図で、図 9 A は像担持体上の電位を示す図、図 9 B は中間転写体上の電位を示す図、図 9 B' は 4 回目の 1 次転写後に中間転写体表面の電位を示す図、図 9 C は 2 次転写電界を示す図である。図 9 A、図 9 B において、転写時には高抵抗を有するこの光導電性中間転写体の転写特性として、転写目的であるトナー像も含めて 1 次転写時に感光体が有していた電位分布も 1 次転写時に中間転写体に転写している。このため中間転写体上に転写されたトナー像を含む画像部より周辺の非画像部電位の方が高くなっており、トナー像は拘束され周辺に飛び散ることない。

【0016】（第 1 の問題点）図 9 B' において、1 次転写を 1 回目～4 回目まで行くと転写トナー像が一側に大きくなる。図 9 C において、2 次転写ロールの表面電位（2 次転写電圧）と中間転写体の非画像部との電位差が 2 次転写ロールの表面電位と画像部との電位差に対して大きいときには 2 次転写電界が非画像部に広がって、画像部の転写電界が低下している。すなわち、前記光導電性中間転写体における第 1 の問題として特に高温高湿下等で用紙の抵抗値が低い場合の 2 次転写時には、転写電界は電位差が大きい非画像部に広がり、トナーも飛び散ってしまうため画像のにじみが発生し良好な画像を得るのが難しくなっていた。

【0017】（第 2 の問題点）第 2 の問題として光導電性物質を含む中間転写体においても最終的なトナー転写効率は従来の中抵抗の中間転写体を用いた場合と同程度であり、画像の構造や色の再現性及びランニングコストの観点からさらなる高転写効率を実現することが求められてきた。

（第 3 の問題点）第 3 の問題点としては、この中間転写体は 1 次転写時に誘電体としての高抵抗を持つことから、カラー画像形成時など複数回にわたりトナー画像を中間転写体上に転写するとき第 2 色目以降では順次 1 次転写電圧を高くしていくことが必要であった。このため特に最終色トナーの 1 次転写時には高電圧が印加されており、より容量の大きな電源が必要でありコストを上げる要因となっていた。

【0018】本発明は前述の事情（及び検討結果）に鑑み、光導電性物質を含む中間転写体を使用した画像形成装置において、下記（O01）、（O02）の記載内容を課題とする。

（O01）2 次転写時の画像部（トナーを転写する部分）と非画像部（トナーを転写しない部分、画像の背景部）との電位差を小さくすることにより、転写電界の非画像部への広がりを防止すること。

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(O02) 中間転写体上に異なる色のトナー像を重ねて1次転写する場合に、低電圧の1次転写電源により良好に1次転写を行えるようにすること。

【0019】

【課題を解決するための手段】次に、前記課題を解決するために案出した本発明を説明するが、本発明の要素には、後述の実施例の要素との対応を容易にするため、実施例の要素の符号をカッコで囲んだものを付記する。なお、本発明を後述の実施例の符号と対応させて説明する理由は、本発明の理解を容易にするためであり、本発明の範囲を実施例に限定するためではない。

【0020】(第1発明)前記第1および第2の問題点を解決するため、第1発明の画像形成装置は、次の要件(A01)～(A08)を備えたことを特徴とする、(A01)帯電領域(Q0)、潜像形成位置(Q1)、現像領域(Q2)、および1次転写領域(Q3)を順次通過して回転移動するとともに、前記帯電領域(Q0)通過時に帯電され、潜像形成位置(Q1)通過時に静電潜像が形成され、現像領域(Q2)通過時にトナー像が形成される表面を有する像担持体(PR)、(A02)前記1次転写領域(Q3)、電位調整領域(Q6)、2次転写領域(Q4)および除電領域(Q7)を順次通過して回転移動する中間転写体(B)であって、光が照射された時に抵抗値が低下する光導電性物質を含有し光が照射されていない状態では高抵抗の誘電体である前記中間転写体(B)、(A03)給紙トレイ(TR1)に収容された記録用シート(S)を前記2次転写領域(Q4)、定着領域(Q5)およびシート排出部に順次搬送するシート搬送装置(SH)、(A04)前記1次転写領域(Q3)において像担持体(PR)上のトナー像を中間転写体(B)上に1次転写する1次転写器(T1)、(A05)前記2次転写領域(Q4)において中間転写体(B)上の1次転写トナー像を前記記録用シート(S)に2次転写する2次転写器(T2)、(A06)前記除電領域(Q7)を通過する中間転写体(B)を光照射により除電する光照射除電器(JK)、(A07)前記定着領域(Q5)を通過する記録用シート(S)上の2次転写トナー像を定着する定着装置(F)、(A08)前記電位調整領域(Q6)において中間転写体(B)上の電位を調整する中間転写体電位調整器(K)。

【0021】(第1発明の作用)前記構成を備えた第1発明の画像形成装置では、帯電領域(Q0)、潜像形成位置(Q1)、現像領域(Q2)、および1次転写領域(Q3)を順次通過して回転移動する像担持体(PR)の表面は、前記帯電領域(Q0)通過時に帯電され、潜像形成位置(Q1)通過時に静電潜像が形成され、現像領域(Q2)通過時にトナー像が形成される。光が照射された時に抵抗値が低下する光導電性物質を含有し光が照射されていない状態では高抵抗の誘電体である前記中間転写体(B)は、前記1次転写領域(Q3)、電位調

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整領域(Q6)、2次転写領域(Q4)および除電領域(Q7)を順次通過して回転移動する。シート搬送装置(SH)は、給紙トレイ(TR1)に収容された記録用シート(S)を前記2次転写領域(Q4)、定着領域(Q5)およびシート排出部に順次搬送する。

【0022】1次転写器(T1)は、前記1次転写領域(Q3)において像担持体(PR)上のトナー像を中間転写体(B)上に1次転写する。光照射除電器(JK)は、前記除電領域(Q7)を通過する中間転写体(B)を光照射により除電する。2次転写器(T2)は、前記2次転写領域(Q4)において中間転写体(B)上の1次転写トナー像を前記記録用シート(S)に2次転写する。定着装置(F)は、前記定着領域(Q5)を通過する記録用シート(S)上の2次転写トナー像を定着する。前記電位調整領域(Q6)において中間転写体電位調整器(K)は、中間転写体(B)上の電位を調整する。

【0023】従来より提案されていたカーボンブラックなどの導電性フィラーを分散した中抵抗の中間転写体とは異なり、光導電性中間転写体(B)は第1及び2次転写時には誘電体としての高抵抗値を保持している。この為、図5A、図5Bのように1次転写後には感光体が画像形成時に保持していた電位分布を光導電性中間転写体表面も持つことになる。反転現像の場合では中間転写体(B)上に形成されたトナー画像周辺はより電位の高い状態となっているため転写トナー像は周辺に散らばることなく良好な1次転写像が得られる。

【0024】しかし特に高温高湿下で用紙の抵抗値が低い状態では2次転写電界が非画像部に広がった状態(図9C参照)になり、この電界の広がりによろしく形でトナーが転写されるため良好な画像を得るのは困難となる。したがって光導電性中間転写体に1次転写後、2次転写前に光照射し、光導電性中間転写体の非画像部の表面電位とトナー画像部の表面電位差を小さくすることにより

(図5C参照)2次転写時における転写電界の広がりを抑えることができ、トナー画像が散らばることなく紙などの最終転写材に転写することができる。ただしこの場合、非画像部の電位を画像部の電位より低くしてしまう程光照射してしまうと、同極性に帯電したトナー同士の反発力や非画像部からの電界によりトナー層が散らばり、周辺に飛び散った画像になってしまう。

【0025】さらに別の方法としてコロナ放電現象を用いることができる。この場合はコロトロンに交流と直流の電圧を重畳して印加し中間転写体表面をコロトロンに印加する直流電圧値近傍にレベルングする方法である。例えば感光体及び中間転写ベルトが負帯電性で反転現像の場合等ではコロトロンに印加する直流電圧を中間転写ベルト上の画像部、非画像部の中間の電位に設定する。図6は中間転写体電位調整器としてコロトロンを使用した場合の電位調整のメカニズムの説明図で、図6Aはコ

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ロトロンに印加する直流電圧を中間転写ベルト上の画像部、非画像部の中間の電位に設定した場合の画像部および非画像部の電位が変化する状態の説明図、図6Bはコロトロンがコロナ放電をしたとき画像部および非画像部の電位の変化する様子を示す図、図6C電位が変化した後の画像部および非画像部の電位状態を示す図である。図6において、コロトロンに印加する直流電圧を中間転写ベルト上の画像部、非画像部の中間の電位に設定することでコロトロンの直流電圧値VDCより電位の低い画像部にはマイナス成分の電流が流れ印加した直流電圧値VDC近傍まで帯電される。またコロトロンの直流電圧値VDCより電位の高い非画像部にはプラス成分の電流が流れ印加した直流電圧値VDC近傍まで下げることができる。この場合、前記コロトロンによるコロナ放電により図6Bの状態が図6Cの状態となる。

【0026】これらのことにより画像部と非画像部の電位レベルの差が小さくなるので、高温高湿下で抵抗値が低下した用紙に2次転写を実施しても電界の広がり、すなわち転写トナーの飛び散りを抑制することができる。またこのとき画像部のトナー層にはさらに電荷が付加されているので、転写電界がより強くなり転写効率を向上することができる。さらには非画像部にあるかぶりトナーは電荷が下がるためもしくは逆極性に転じる事により、かぶりトナーの転写を抑制できる。

【0027】(第2発明)前記第3の問題点を解決するため、第2発明の画像形成装置は、次の要件(B01)～(B09)を備えたことを特徴とする、(B01)帯電領域(Q0)、潜像形成位置(Q1)、現像領域(Q2)、および1次転写領域(Q3)を順次通過して回転移動するとともに、前記帯電領域(Q0)通過時に帯電され、潜像形成位置(Q1)通過時に静電潜像が形成され、現像領域(Q2)通過時にトナー像が形成される表面を有する像担持体(PR)、(B02)前記1次転写領域(Q3)、電位調整領域(Q6)、2次転写領域(Q4)および除電領域(Q7)を順次通過して回転移動する中間転写体(B)であって、光が照射された時に抵抗値が低下する光導電性物質を含有し光が照射されていない状態では高抵抗の誘電体である前記中間転写体(B)、(B03)給紙トレイ(TR1)に収容された記録用シート

(S)を前記2次転写領域(Q4)、定着領域(Q5)およびシート排出部に順次搬送するシート搬送装置(SH)、(B04)前記1次転写領域(Q3)において像担持体(PR)上のトナー像を中間転写体(B)上に1次転写する1次転写器(T1)、(B05)前記除電領域(Q7)を通過する中間転写体(B)を光照射により除電する光照射除電器(JK)、(B06)前記2次転写領域(Q4)において中間転写体(B)上の1次転写トナー像を前記記録用シート(S)に2次転写する2次転写器(T2)、(B07)前記定着領域(Q5)を通過する記録用シート(S)上の2次転写トナー像を定着する定着

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装置(F)、(B08)前記中間転写体(B)の移動経路上に設定された電位調整領域(Q6)において中間転写体(B)上の電位を調整する中間転写体電位調整器

(K)、(B09)前記1次転写が行われる度に前記電位調整を実行する電位調整器制御手段(C7')。

【0028】(第2発明の作用)前記構成を備えた第2発明の画像形成装置では、帯電領域(Q0)、潜像形成位置(Q1)、現像領域(Q2)、および1次転写領域(Q3)を順次通過して回転移動する像担持体(PR)の表面は、前記帯電領域(Q0)通過時に帯電され、潜像形成位置(Q1)通過時に静電潜像が形成され、現像領域(Q2)通過時にトナー像が形成される。光が照射された時に抵抗値が低下する光導電性物質を含有し光が照射されていない状態では高抵抗の誘電体である中間転写体(B)は、前記1次転写領域(Q3)、電位調整領域(Q6)、2次転写領域(Q4)および除電領域(Q7)を順次通過して回転移動する。シート搬送装置(SH)は、給紙トレイ(TR1)に収容された記録用シート(S)を前記2次転写領域(Q4)、定着領域(Q5)およびシート排出部に順次搬送する。

【0029】1次転写器(T1)は、前記1次転写領域(Q3)において像担持体(PR)上のトナー像を中間転写体(B)上に1次転写する。光照射除電器(JK)は、前記除電領域(Q7)を通過する中間転写体(B)を光照射により除電する。前記2次転写領域(Q4)において2次転写器(T2)は、中間転写体(B)上の1次転写トナー像を前記記録用シート(S)に2次転写する。定着装置(F)は、前記定着領域(Q5)を通過する記録用シート(S)上の2次転写トナー像を定着する。

【0030】前記中間転写体(B)の移動経路上に設定された電位調整領域(Q6)において中間転写体電位調整器(K)は、中間転写体(B)上の電位を調整する。電位調整器制御手段(C7')は、前記1次転写が行われる度に前記電位調整を実行する。前記電位調整は光照射またはコロナ放電により行うことができる。

【0031】すなわち、前記1次転写後に中間転写体(B)上に光照射することで、中間転写体(B)に転写された画像形成時の感光体電位分布を調整することができる。このときの電位レベルは画像部の中間転写体表面の電位とその上に形成されているトナー像電位をあわせたレベル以上とする。この場合も2次転写時と同様、非画像部の電位を低くするとトナー像は周辺に飛び散ってしまう。1次転写中の中間転写体電位レベルを下げることで、2色目以降のトナー像を転写する場合でも1次転写電圧が大きく上昇することを防止できる。コロトロンなどによる放電現象で中間転写体表面をトナー層も含めて電位調整した場合も同様中間転写体(B)の全体としての電位を下げることで1次転写電圧が大きく上昇することを防止できる。なお、中間転写体(B)上の画

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像部と非画像部の電位は1次と2次転写の設定により変わるものであり、またコトロン等により調整する電位も随時必要に応じて設定すればよい。

【0032】

【実施の形態】（実施の形態1）本発明の画像形成装置の実施の形態1は、前記第1または第2発明において下記の要件（AB01）を備えたことを特徴とする、

（AB01）中間転写体（B）に光を照射する光照射器により構成された前記中間転写体電位調整器（K）。

【0033】（実施の形態1の作用）前記構成をそなえた本発明の画像形成装置の実施の形態1では、前記中間転写体電位調整器（K）は、中間転写体（B）に光を照射する光照射器により構成される。光導電性物質を含む前記中間転写体（B）は、光照射によりの電位を調整することができる。

【0034】（実施の形態2）本発明の画像形成装置の実施の形態2は、前記第1または第2発明において下記の要件（AB02）を備えたことを特徴とする、

（AB02）コロナ放電器により構成された前記中間転写体電位調整器（K）。

【0035】（実施の形態2の作用）前記構成をそなえた本発明の画像形成装置の実施の形態2では、前記中間転写体電位調整器（K）は、コロナ放電器により構成される。前記中間転写体（B）は、コロナ放電器により電位を調整することができる。

【0036】（実施例）次に図面を参照しながら、本発明の実施の形態の具体例（実施例）を説明するが、本発明は以下の実施例に限定されるものではない。

【0037】（実施例1）図1は本発明の実施例1の画像形成装置の全体説明図である。図1に示す本実施例1の画像形成装置Uの説明において、前記図8に示す従来の画像形成装置の構成要素と同一の構成要素には、前記図8で使用した符号と同一の符号を付して、その詳細な説明は省略する。図1に示した本発明の画像形成装置の実施例1は、前記図8に示した従来の画像形成装置と略同一に構成されているが、下記の点で相違している。

【0038】前記図1に示した画像形成装置の2次転写領域Q4の中間転写ベルトBの搬送方向上流側に設定された電位調整領域Q6には赤色LED（光照射器）により構成された中間転写体電位調整器Kが配置されている。中間転写ベルトBを挟んで前記中間転写体電位調整器Kと対向する位置にはアースロール（アースされたロール）Reが配置されている。前記中間転写体電位調整

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器Kによる光照射により中間転写ベルトBの電位が調整される。前記図1に示した画像形成装置の2次転写領域Q4の中間転写ベルトBの搬送方向下流側に設定された中間転写体除電領域Q7には赤色LED（光照射器）により構成された光照射除電器JKが配置されている。中間転写ベルトBを挟んで前記光照射除電器JKと対向する位置にはアースされたアイドラールReが配置されている。中間転写体除電領域Q7において前記光照射除電器JKによる光照射により中間転写ベルトBが除電される。前記中間転写体電位調整器Kおよび光照射除電器JKに印加される電圧は電源回路E（図1参照、配線は図示せず）から供給される。

【0039】（2次転写器T2）前記バックアップロールT2aと、このバックアップロールT2aから離れた離隔位置および押圧される近接位置の間で離接可能（離隔および接近可能）に配置された2次転写ロールT2bと、前記バックアップロールT2aに当接する金属製の電極ロールT2cとにより2次転写器T2が構成される。前記バックアップロールT2aは導電性の金属ロールに半導電性の弾性体を巻き付けて構成されており、例えばその表面抵抗率は $1 \times 10^7 \Omega/\square$ 以上に調整されている。また、前記アースされた2次転写ロールT2bは金属ロールの表面をカーボン分散発砲ウレタンで包み、その外側を半導電性の薄層フィルムで被覆し、例えばその体積抵抗率は $10^9 \Omega \text{ cm}$ に調整されている。

【0040】（中間転写ベルトB）図2は本発明の画像形成装置の実施例1で使用されている中間転写ベルトの構成を示す図である。前記画像形成装置の実施例1で使用されている中間転写ベルト（ベルト状の中間転写体）Bは次のように構成されている。図2において前記中間転写ベルトBは、4層構造で、裏面から表面側に向かって順次ベルト基材B1、ブロッキング層B2a、電荷発生層B2b、および電荷輸送層B2cが積層されている。なお、前記電荷発生層B2b、電荷輸送層B2cにより光導電層B2が構成されている。

（ベルト基材B1）カーボン黒を15重量%添加したポリイミド樹脂により構成され、膜厚 $75 \mu\text{m}$ に形成されている。体積抵抗率は $10^{9.5} \Omega \text{ cm}$ 、表面抵抗は $10^{12} \Omega/\square$ に設定されている。

【0041】（ブロッキング層B2a）ブロッキング層（B2a）は、例えば次のようにして形成することができる。

アセチルアセトンジルコニウムブトキシド（オルガチックスZC540、松本交商社製）
20重量部

γ-アミノプロピルトリエトキシシラン
2重量部

ポリビニルブチラール樹脂（エスレックBM-S、積水化学（株）製）

1.5重量部

n-ブチルアルコール

70重量部

上記成分からなる溶液を、基材（B1）表面に塗布後、

乾燥させて例えば $0.9 \mu\text{m}$ に形成する。前記ブロッキ

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ング層(B2a)は- (マイナス) 極性のキャリアである電子の移動は許すが+ (プラス) 極性キャリアであるホール移動は阻止する機能を有する。

【0042】(電荷発生層B2b) フタロシアニン顔料系電荷発生剤を添加したPVK (Poly vinyl carbazole、ポリビニルカルバゾール) により形成された膜厚0.25 μ mの層である。光が照射されると、+ (プラス) および- (マイナス) の電荷を発生する。

【0043】(電荷輸送層(ホール輸送層) B2c) トリフェニルアミン系電荷輸送剤を添加したポリカーボネート樹脂により構成され、膜厚25 μ mである。+ (プラス) 極性のキャリアであるホールの移動は許すが- (マイナス) 極性キャリアである電子の移動は阻止する機能を有する。すなわち、本実施例1の電荷輸送層B2cはホール輸送層である。

【0044】(実施例1の制御部の説明) 図3は前記実施例1の制御部のブロック線図である。前記コントローラCには、UI (ユーザインタフェース) が接続されており、UIは、コピースタートキー(ジョブスタートキー) UIa、フルカラーモード選択キーUIb、テンキーUIc、表示器UID等を有している。前記コントローラCには次のセンサの検出信号が入力されている。

SNB: ベルト位置センサ

ベルト位置センサSNB(図1、図3参照)は中間転写ベルトBに付けたマーク(目印)を検出し、検出信号を前記コントローラCに出力する。

SN1: シートサイズセンサ

シートサイズセンサSN1は、シート(用紙)通過の有無および用紙サイズ(シートサイズ)を検出ためのセンサであり、検出信号を前記コントローラCに出力する。なお、前記コントローラCには、図示しない排紙センサ、定着装置温度センサ、その他のセンサの検出信号が入力される。

【0045】前記UI(ユーザインタフェース)、前記各種センサSNB、SN1、...からの信号が入力される前記コントローラCは、前記IPSの作動タイミング制御信号、レーザ駆動信号出力装置DLの作動タイミング制御信号、中間転写ベルトBを回転駆動するためのベルト駆動モータMを駆動するベルト駆動回路D、電源回路Eの1次転写用電源回路E1、2次転写用電源回路E2、中間転写体電位調整用電源E3、除電器用電源回路E4等の作動制御信号を出力している。前記コントローラCの出力する制御信号に応じて、中間転写体電位調整用電源E3は前記中間転写体電位調整器Kを駆動し、除電器用電源回路E4は光照射除電器JKを駆動する。

【0046】前記種々の入力信号に応じた処理を実行する前記コントローラCは、外部との信号の入出力および入出力信号レベルの調節等を行うI/O(入出力インタフェース)、必要な処理を行うためのプログラムおよびデータ等が記憶されたROM(リードオンリーメモ

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リ)、必要なデータを一時的に記憶するためのRAM(ランダムアクセスメモリ)、ならびに、前記ROMに記憶されたプログラムに応じた入出力制御および演算処理等を行うCPU(中央演算処理装置)等を有するコンピュータにより構成されており、前記ROMに記憶されたプログラムを実行することにより種々の機能を実現することができる。すなわち、コントローラCは次の機能を有している。

【0047】C1: ベルト位置検出手段

ベルト位置検出手段C1は、前記ベルト位置センサSNBが前記ベルトマークMKを検出した時刻からの経過時間を計測することにより中間転写ベルトBの回転位置を検出している。

C2: シートサイズ検出手段

シートサイズ検出手段C2は、前記シートサイズセンサSN1が検出するシート(用紙)先端および後端の通過時刻によりシート(用紙)搬送方向のシートサイズを検出する。

【0048】C3: 書込タイミング通知信号出力手段

書込タイミング通知信号出力手段C3は、前記ベルト位置センサSNBのベルトマーク検出信号に基づいて、書込タイミング通知信号を前記IPSおよびレーザ駆動信号出力装置DLに出力している。すなわち、前記ベルト位置センサSNBがベルトマークを検出してから所定時間後に、中間転写ベルトB上のトナー像転写開始位置が前記1次転写領域Q3に到達するので、それにタイミングを合わせて像担持体PR上に形成されるトナー像の前端を前記1次転写位置Q3に到達させる必要がある。そのためには、所定のタイミングで前記ROSによる潜像形成位置Q1への画像書込を開始する必要がある。このために、書込タイミング通知信号出力手段C3は、前記書込タイミング通知信号を出力しているのである。なお、前記IPSおよびレーザ駆動信号出力装置DLは前記書込タイミング通知信号が出力されてから所定のタイミングでレーザ駆動信号出力装置DLからレーザ駆動信号をROSに出力する。

【0049】C4: ベルト制御手段

ベルト制御手段はC4は、前記中間転写ベルトBを回転駆動するベルト駆動モータMのベルト駆動回路Dの制御信号を出力する。

C5: 1次転写器制御手段

1次転写器制御手段C5は、1次転写領域Q3を中間転写ベルトBの画像形成領域が通過する際に1次転写器T1に一定の1次転写電流または電圧を印加する。

C6: 2次転写器制御手段

2次転写器制御手段C6は、2次転写領域Q3を中間転写ベルトBの画像形成領域が通過する際、2次転写を行うため2次転写器T2に一定の2次転写電流または電圧を印加する。

【0050】C7: 電位調整器制御手段

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電位調整器制御手段C7は、中間転写ベルトBの2次転写領域Q4上流側の電位調整領域Q6を通過する中間転写ベルトB表面の電位を調整する中間転写体電位調整器(赤色LED)Kの点灯制御信号を出力する。

【0051】C8: 除電器点灯制御手段

除電器点灯制御手段C8は、中間転写ベルトBの2次転写が行われた部分が除電領域Q7を通過する際、前記光照射除電器JKを点灯するように除電器点灯制御信号を前記除電器用電源回路E4(図3参照)に出力する。

【0052】前記除電器点灯制御手段C7を有するコントローラCおよび除電器用電源回路E4により、光源制御回路(C+E4)が構成されている。前記除電器点灯制御手段C7を有するコントローラC、除電器用電源回路E4、光照射除電器JKにより抵抗率制御装置(C+E4+JK)が構成されている。

【0053】(電位調整器Kおよび光照射除電器JKの作動タイミング)図4は実施例1の1次転写器T1、中間転写体電位調整器K、2次転写器T2、および光照射除電器JKのタイムチャートである。図4において、この実施例1の画像形成装置の中間転写体電位調整器K

(表1) 1次転写ロール直流印加電圧

	1次転写後の露光	
	無	有
1次転写1cycle後	380V	380V
1次転写2cycle後	480V	410V
1次転写3cycle後	650V	460V
1次転写4cycle後	800V	490V

1次転写電流: $6\mu\text{A}$

表1に示したように、1次転写電流を $6\mu\text{A}$ 流すためには、実施例1の1次転写ロールT1に印加する正電圧(露光無しの場合の電圧)は1次転写後の露光有り(後述の実施例3、4参照)の場合より高い電圧が必要である。

【0056】表2は実施例1、2の1次転写後の露光無

(表2) 光導伝性中間転写体の表面電位と一次転写電圧

	1次転写後の露光無し		1次転写後の露光有り	
	中間転写体表面電位	1次転写電圧	中間転写体表面電位	1次転写電圧
1次転写1cycle後	-125V	380V	-90V	380V
1次転写2cycle後	-300V	480V	-185V	410V
1次転写3cycle後	-450V	650V	-260V	460V
1次転写4cycle後	-625V	800V	-350V	490V
2次転写前露光後	-400V	—	—	—
2次転写後	-110V	—	-80V	—
2次転写後露光後	-20V	—	-15V	—

【0057】前記1次転写ロールT1には $6\mu\text{A}$ の定電流制御の正電圧を印加し、1色目から4色目まで順次印加電圧を変化させたときの、1次転写ロール直流印加電

は、複数回の1次転写終了後(4色のトナー像の中の最終転写トナー像の1次転写終了後)で2次転写前に光照射による光導伝性中間転写体の電位調整を行うように制御される。また、前記光照射除電器JKは2次転写終了後に光照射による中間転写ベルトBの除電を行うように制御される。

【0054】(実施例1の作用)次に、この実施例1の画像形成装置を使用して、高温高湿下(28℃、85%)で画像形成動作を行った場合の作用について説明する。

(用紙)用紙は高温高湿下(28℃、85%)で12時間保管し、充分抵抗値が下がった状態にした。このときの用紙の体積抵抗率をKethly 487 Picoammeter及び8009 Resistivity test fixtureにおいて測定したところ、 $4.58 \times 10^8 \Omega \cdot \text{cm}$ であった。

【0055】(1次転写電圧)表1は実施例1、2の1次転写後の露光無しの場合に必要な1次転写ロール直流印加電圧と、後述の実施例3、4の露光有りの場合に必要1次転写ロール直流印加電圧を示す表である。

【表1】

しの場合(電位調整器Kの調整無しの場合)の1次転写電圧および中間転写体表面電位と、後述の実施例3の露光有りの場合に必要1次転写電圧および中間転写体表面電位とを示す表である。

【表2】

圧は前記表1に示すとおりであり、中間転写体表面の非画像部電位は次のとおり(表2参照)である。
1色目転写後: -125V 、

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2色目転写後：-300V、
3色目転写後：-450V、
4色目転写時：-625V。

【0058】4色目の1次転写後でかつ2次転写前に赤色LEDにより構成した中間転写体電位調整器Kにより中間転写体表面の電位調整を行ったときの露光後（電位調整後）の非画像部電位は-400Vであった。図5は実施例1の高抵抗の光導電性中間転写体（中間転写ベルト）Bを使用して、像担持体（感光体）PRから中間転写体Bにトナー像を転写する場合のトナー像およびその周囲の電位を示す図で、図5Aは像担持体PR上の電位を示す図、図5Bは中間転写体B上の電位を示す図で1次転写を繰り返す毎に電位（-電位）が上昇することを示す図、図5B'は4回目の1次転写後に露光することにより中間転写体表面の電位が低下することを示す図、図5Cは中間転写体B表面の画像電位と非画像電位との差が小さくなったために2次転写電界の非画像部への広がりが無くなった状態を示す図である。図5Cの状態では、前記図9Cと比較して、2次転写電界の非画像部への広がりが無くなったために、トナーの飛び散り等が減少する。

（2次転写電圧）本実施例1では前記図5Cの状態で、2次転写ロールT2bには1000Vの定電圧を印加し転写を行った。

【0059】（画像パターン）プリントサンプルの画像パターンには2種類用意し1枚目はイエロー、マゼンタ、シアン、黒各単色、2次色、3次色の2cm角大のソリッド及び黒トナー単色による大きさの異なる漢字をセットにしたものとし、2枚目は黒トナー単色の400line/inchのハーフトーン画像とし、2種のサンプルを交互に出力した。1枚目のプリントの2次転写直後での中間転写体表面電位は-70Vから-100V程度の画像パターンに応じた表面電位ムラがあったが、光照射除電器JKによる光照射後には中間転写体の表面電位は-10Vから-30Vの間でほぼ均一となり、次のプリントサンプルである400line/inchのハーフトーン画像においても濃度ムラや飛び散りの無い均一な画像が得られた。2種のプリントサンプルを交互に合計20000枚出力したが濃度ムラ、飛び散り、画像の太りの無い良好な画像が得られた。

【0060】（実施例2）本発明の画像形成装置の実施例2は、次の点で前記実施例1の画像形成装置と相違しているが、他の点では前記実施例1と同様に構成されている。前記実施例1では光照射器により構成された中間転写体電位調整器Kを使用していたのに対し、本実施例2では、スコトロンにより構成された中間転写体電位調整器Kを使用した点。この実施例2の画像形成装置の中間転写体電位調整器Kおよび光照射除電器JKの作動タイミングは前記実施例1と同様である。すなわち、タイミングチャートは前記図4と同様である。すなわち、中

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間転写体電位調整器Kは、複数回の1次転写終了後（4色のトナー像の中の最終転写トナー像の1次転写終了後）で2次転写前に光照射による光導電性中間転写体の電位調整を行うように制御される。また、光照射除電器JKは2次転写終了後のみ除電を行うように制御される。

【0061】（実施例2の作用）次に、この実施例2の画像形成装置を使用して、高温高湿下（28℃、85%）で画像形成動作を行った場合の作用について説明する。

（用紙）用紙は前記実施例1と同様の用紙を使用した。

（1次転写電圧）1次転写ロールT1には6μAの定電流制御の正電圧を印加し、1色目から4色目まで順次印加電圧が変化できるようにした。このときの中間転写体表面の非画像部電位は次のとおりであった。

1色目転写後：-125V、
2色目転写後：-300V、
3色目転写後：-450V、
4色目転写時：-625V。

【0062】4色目の1次転写後でかつ2次転写前にスコトロンにより構成した中間転写体電位調整器Kにより中間転写体表面の電位調整を行ったときの露光後（電位調整後）の非画像部電位は-400Vであった。

（2次転写電圧）2次転写ロールT2bには1000Vの定電圧を印加し転写を行った。

【0063】（画像パターン）プリントサンプルの画像パターンには2種類用意し1枚目はイエロー、マゼンタ、シアン、黒各単色、2次色、3次色の2cm角大のソリッド及び黒トナー単色による大きさの異なる漢字をセットにしたものとし、2枚目は黒トナー単色の400line/inchのハーフトーン画像とし、2種のサンプルを交互に出力した。1枚目のプリントの2次転写直後での中間転写体表面電位は-70Vから-100V程度の画像パターンに応じた表面電位ムラがあったが、光照射除電器JKによる電位調整後には中間転写体の表面電位は-10Vから-30Vの間でほぼ均一となり、次のプリントサンプルである400line/inchのハーフトーン画像においても濃度ムラや飛び散りの無い均一な画像が得られた。2種のプリントサンプルを交互に合計20000枚出力したが濃度ムラ、飛び散り、画像の太りの無い良好な画像が得られた。

【0064】（実施例3）本発明の画像形成装置の実施例3は、次の点で前記実施例1の画像形成装置と相違しているが、他の点では前記実施例1と同様に構成されている。この実施例3の画像形成装置では、中間転写体電位調整器Kの作動タイミングが前記実施例1と相違している。図7は実施例3の1次転写器T1、中間転写体電位調整器K、2次転写器T2、および光照射除電器JKのタイムチャートである。前記実施例1の中間転写体電位調整器Kは、複数回の1次転写終了後（4色のトナー

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像の中の最終転写トナー像の1次転写終了後)で2次転写前に光照射による光導電性中間転写体の電位調整を行うように制御されていたのに対して、この実施例3の中間転写体電位調整器Kは、図7に示すように、1次転写終了毎に、光照射による光導電性中間転写体の電位調整を行うように制御される。前記中間転写体電位調整器Kの制御は、実施例3のコントローラCの電位調整器制御手段C7'により行われる。

【0065】(実施例3の作用)次に、この実施例3の画像形成装置を使用して、高温高湿下(28℃、85%)で画像形成動作を行った場合の作用について説明する。

(用紙)用紙は前記実施例1と同様の用紙を使用した。

(1次転写電圧)1次転写ロールT1には6μAの定電流制御の正電圧を印加し、1色目から4色目まで順次印加電圧が変化できるようにした。このとき各色のトナーの1次転写後ごとに中間転写体電位調整器K(赤色LED)による光照射を行い、中間転写体表面電位の調整を随時実施した。このときの中間転写体表面の非画像部電位は次のとおりであった。

- 1色目転写後：-90V、
- 2色目転写後：-185V、
- 3色目転写後：-260V、
- 4色目転写時：-350V。

【0066】前記表1は実施例3の1次転写後の露光有りの場合の1次転写ロール直流印加電圧と、比較のための露光無しの場合に必要な1次転写ロール直流印加電圧が示されている。前記表1に示したように、1次転写ロールT1に印加する正電圧は1次転写後に露光しない場合より低い電圧となっている。

【0067】前記表2には実施例3の1次転写後の露光有りの場合(電位調整器Kの調整有りの場合)の1次転写電圧および中間転写体表面電位と、比較のための露光無しの場合に必要な1次転写電圧および中間転写体表面電位とが示されている。

【0068】(2次転写電圧)2次転写ロールT2bには1000Vの定電圧を印加し転写を行った。

【0069】(画像パターン)プリントサンプルの画像パターンには2種類用意し1枚目はイエロー、マゼンタ、シアン、黒各単色、2次色、3次色の2cm角大のソリッド及び黒トナー単色による大きさの異なる漢字をセットにしたものとし、2枚目は黒トナー単色の400line/inchのハーフトーン画像とし、2種のサンプルを交互に出力した。1枚目のプリントの2次転写直後での中間転写体表面電位は-60Vから-80V程度の画像パターンに応じた表面電位ムラがあったが、光照射除電器JKによる光照射後には中間転写体の表面電位は-10Vから-30Vの間でほぼ均一となり、次のプリントサンプルである400line/inchのハーフトーン画像においても濃度ムラや飛び散りの無い均

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一な画像が得られた。2種のプリントサンプルを交互に合計20000枚出力したが濃度ムラ、飛び散り、画像の太りの無い良好な画像が得られた。

【0070】(実施例4)本発明の画像形成装置の実施例4は、次の点で前記実施例1の画像形成装置と相違しているが、他の点では前記実施例1と同様に構成されている。前記実施例1では光照射器により構成された中間転写体電位調整器Kを使用していたのに対し、本実施例4では、スコトロンにより構成された中間転写体電位調整器Kを使用している。また、この実施例4の画像形成装置では、中間転写体電位調整器Kの作動タイミングが前記実施例1と相違している。すなわち、前記実施例1の中間転写体電位調整器Kは、複数回の1次転写終了後(4色のトナー像の中の最終転写トナー像の1次転写終了後)で2次転写前に光照射による光導電性中間転写体の電位調整を行うように制御されていたのに対して、この実施例4の中間転写体電位調整器Kは1次転写終了毎に、スコトロンのコロナ放電(直流及び交流電圧を重畳)により光導電性中間転写体の電位調整を行うように制御される。したがって、実施例4のタイムチャートは前記実施例3のタイムチャート(図7参照)と同一である。

【0071】(実施例4の作用)次に、この実施例4の画像形成装置を使用して、高温高湿下(28℃、85%)で画像形成動作を行った場合の作用について説明する。

(用紙)用紙は前記実施例1と同様の用紙を使用した。

(1次転写電圧)1次転写ロールT1には6μAの定電流制御の正電圧を印加し、1色目から4色目まで順次印加電圧が変化できるようにした。このとき各色のトナーの1次転写後ごとに中間転写体電位調整器(スコトロン)Kによるコロナ放電を行い、中間転写体表面電位の調整を行った。このときの中間転写体電位調整器(スコトロン)Kに印加する直流電圧は次のとおりであった。

- 1色目転写後：-90V、
- 2色目転写後：-175V、
- 3色目転写後：-240V、
- 4色目転写時：-330V。

【0072】この場合、中間転写体電位調整器(スコトロン)Kによる電位調整後の中間転写体表面の非画像部電位は次のとおりであった。

- 1色目転写後：-100V、
- 2色目転写後：-195V、
- 3色目転写後：-270V、
- 4色目転写時：-360V。

【0073】(2次転写電圧)2次転写ロールT2bには1000Vの定電圧を印加し転写を行った。

【0074】(画像パターン)プリントサンプルの画像パターンには2種類用意し1枚目はイエロー、マゼン

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タ、シアン、黒各単色、2 次色、3 次色の 2 cm 角大のソリッド及び黒トナー単色による大きさの異なる漢字をセットにしたものとし、2 枚目は黒トナー単色の 400 line/inch のハーフトーン画像とし、2 種のサンプルを交互に出力した。1 枚目のプリントの 2 次転写直後での中間転写体表面電位は -60 V から -80 V 程度の画像パターンに応じた表面電位ムラがあったが、光照射除電器 JK による光照射後には中間転写体の表面電位は -10 V から -30 V の間でほぼ均一となり、次のプリントサンプルである 400 line/inch のハーフトーン画像においても濃度ムラや飛び散りの無い均一な画像が得られた。2 種のプリントサンプルを交互に合計 20000 枚出力したが濃度ムラ、飛び散り、画像の太りの無い良好な画像が得られた。

【0075】(比較例) 比較例として中間転写体電位調整器 K を設けない画像形成装置の動作を説明する。

(比較例の作用) 次に、前記比較例の画像形成装置を使用して、高温高湿下 (28℃、85%) で画像形成動作を行った場合の作用について説明する。

(用紙) 用紙は前記実施例 1 と同様の用紙を使用した。

(1 次転写電圧) 1 次転写ロール T1 には 6 μ A の定電流制御の正電圧を印加し、1 色目から 4 色目まで順次印加電圧が変化できるようにした。このとき各色のトナーの 1 次転写後の中間転写体表面電位は次のとおりであった。

- 1 色目転写後: -125 V、
- 2 色目転写後: -300 V、
- 3 色目転写後: -450 V、
- 4 色目転写時: -625 V。

【0076】(2 次転写電圧) 2 次転写ロール T2b には 1000 V の定電圧を印加し転写を行った。

【0077】(画像パターン) プリントサンプルの画像パターンには 2 種類用意し 1 枚目はイエロー、マゼンタ、シアン、黒各単色、2 次色、3 次色の 2 cm 角大のソリッド及び黒トナー単色による大きさの異なる漢字をセットにしたものとし、2 枚目は黒トナー単色の 400 line/inch のハーフトーン画像とし、2 種のサンプルを交互に出力した。1 枚目のプリントの 2 次転写直後での中間転写体表面電位は -80 V から -110 V 程度の画像パターンに応じた表面電位ムラがあったが、光照射除電器 JK による光照射後には中間転写体の表面電位は -10 V から -30 V の間でほぼ均一となり、次のプリントサンプルである 400 line/inch のハーフトーン画像においては、高温高湿下での用紙抵抗低下と転写電界の偏りによるものと考えられる濃度ムラや飛び散りが発生している画像となった。

【0078】(変更例) 以上、本発明の実施例を詳述したが、本発明は、前記実施例に限定されるものではなく、特許請求の範囲に記載された本発明の要旨の範囲内で、種々の変更を行うことが可能である。本発明の変更

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実施例を下記に例示する。

(H01) 本発明で使用する中間転写体は複数の像担持体を備えたタンデム式の画像形成装置でも使用可能である。

(H02) 2 次転写器 T2 は、バックアップロール T2a、2 次転写ロール T2b、および前記バックアップロール T2a に当接するコンタクトロールにより構成することが可能である。

(H03) 前記実施例においてはカーボンブラックを分散した最下層表面上に下地層、電荷発生層、電荷輸送層の順に膜形成した 4 層構造の中間転写体を用いた例を示したが、中間転写体を光導電性をもつ単層のみ、もしくはカーボンブラック等を分散した下地層表面上に光導電層を形成した 2 層とした場合でも同様の作用で良好な画質を安定して得ることができる。

(H04) 前記実施例の光照射による中間転写体の電位調整は中間転写体表面側から行っているが、光導電性中間転写体が単層の場合や、複層でも最下層が透過性の場合には裏面から光照射を行うことが可能である。

【0079】

【発明の効果】 前述の本発明の画像形成装置は、下記の効果を奏することができる。

(E01) 2 次転写時の画像部 (トナーを転写する部分) と非画像部 (トナーを転写しない部分、画像の背景部) との電位差を小さくすることにより、転写電界の非画像部への広がりを防止することができる。したがって、高温高湿下など用紙抵抗値が低下した場合でもトナー画像が飛び散ることなく良好な画像のまま転写することができる。

(E02) 1 次転写時には誘電体としての高抵抗を有する光導電性中間転写体においても印加する 1 次転写電圧が大きく上昇することなく複数回の 1 次転写を連続して行うことができる。したがって、中間転写体上に異なる色のトナー像を重ねて 1 次転写する場合に、低電圧の 1 次転写電源により良好に 1 次転写を行うことができる。

【図面の簡単な説明】

【図 1】 図 1 は本発明の実施例 1 の画像形成装置の全体説明図である。

【図 2】 図 2 は本発明の画像形成装置の実施例 1 で使用されている中間転写ベルトの構成を示す図である。

【図 3】 図 3 は前記実施例 1 の制御部のブロック線図である。

【図 4】 図 4 は実施例 1 の 1 次転写器 T1、中間転写体電位調整器 K、2 次転写器 T2、および光照射除電器 JK のタイムチャートである。

【図 5】 図 5 は実施例 1 の高抵抗の光導電性中間転写体 (中間転写ベルト) B を使用して、像担持体 (感光体) PR から中間転写体 B にトナー像を転写する場合のトナー像およびその周囲の電位を示す図で、図 5 A は像担持体 PR 上の電位を示す図、図 5 B は中間転写体 B 上

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の電位を示す図で1次転写を繰り返す毎に電位（－電位）が上昇することを示す図、図5B'は4回目の1次転写後に露光することにより中間転写体表面の電位が低下することを示す図、図5Cは中間転写体B表面の画像電位と非画像電位との差が小さくなったために2次転写電界の非画像部への広がりが無くなった状態を示す図である。

【図6】 図6は中間転写体電位調整器としてコロトロンを使用した場合の電位調整のメカニズムの説明図で、図6Aはコロトロンに印加する直流電圧を中間転写ベルト上の画像部、非画像部の中間の電位に設定した場合の画像部および非画像部の電位が変化する状態の説明図、図6Bはコロトロンがコロナ放電をしたとき画像部および非画像部の電位の変化する様子を示す図、図6C電位が変化した後の画像部および非画像部の電位状態を示す図である。

【図7】 図7は実施例3の1次転写器T1、中間転写体電位調整器K、2次転写器T2、および光照射除電器JKのタイムチャートである。

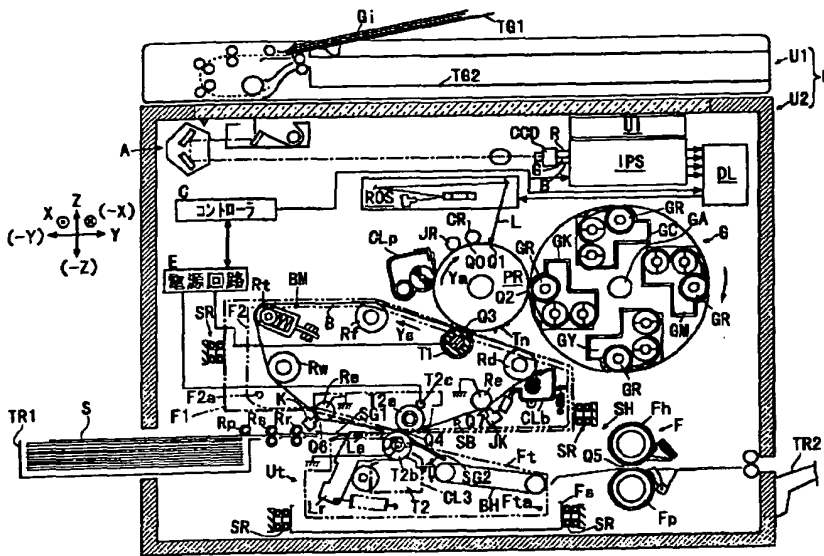
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【図8】 図8は中間転写体を使用した従来の画像形成装置の説明図である。

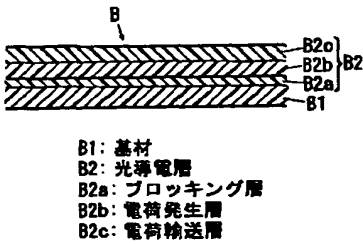
【図9】 図9は前記特願平10-123999号（特開平 一号公報）のような高抵抗の光導電性中間転写体を使用して、像担持体（感光体）から中間転写体にトナー像を転写する場合のトナー像およびその周囲の電位を示す図で、図9Aは像担持体上の電位を示す図、図9Bは中間転写体上の電位を示す図、図9B'は4回目の1次転写後に中間転写体表面の電位を示す図、図9Cは2次転写電界を示す図である。

【符号の説明】
B…中間転写体、C7'…電位調整器制御手段、F…定着装置、JK…光照射除電器、K…中間転写体電位調整器、Q0…帯電領域、Q1…潜像形成位置、Q2…現像領域、Q3…1次転写領域、Q4…2次転写領域、Q5…定着領域、Q6…電位調整領域、Q7…除電領域、PR…像担持体、S…記録用シート、SH…シート搬送装置、T1…1次転写器、T2…2次転写器、TR1…給紙トレイ。

【図1】

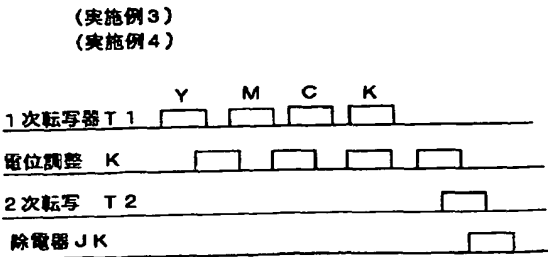
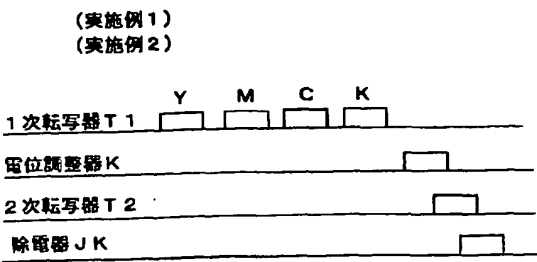


【図2】



【図4】

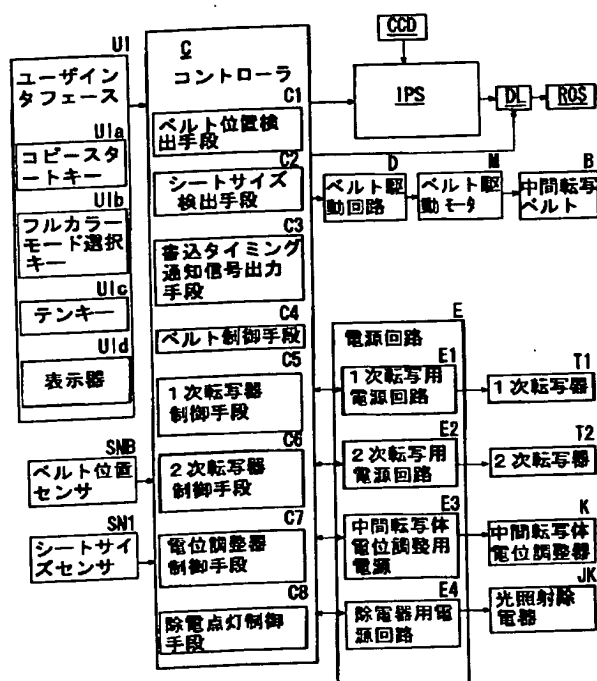
【図7】



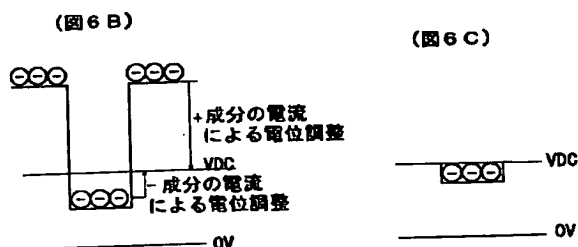
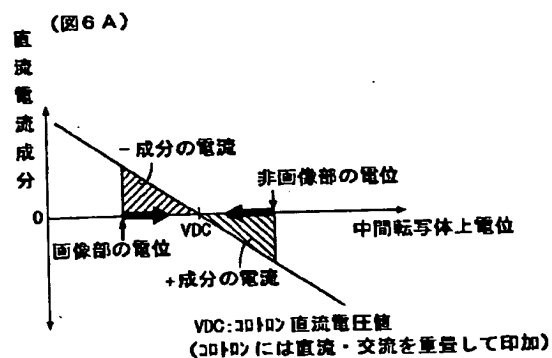
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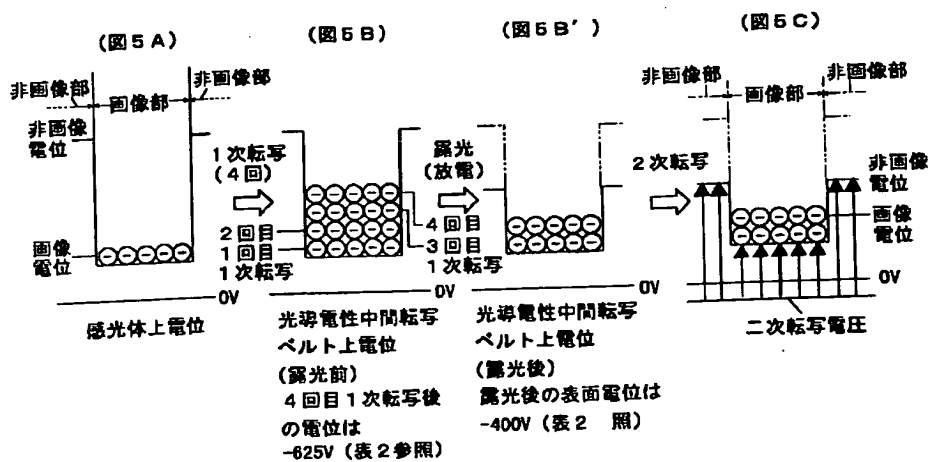
【図3】



【 6】



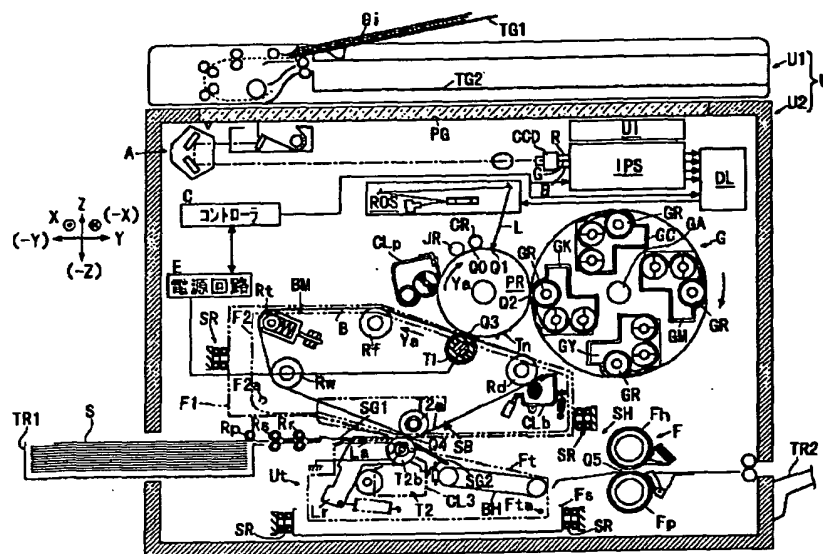
【图5】



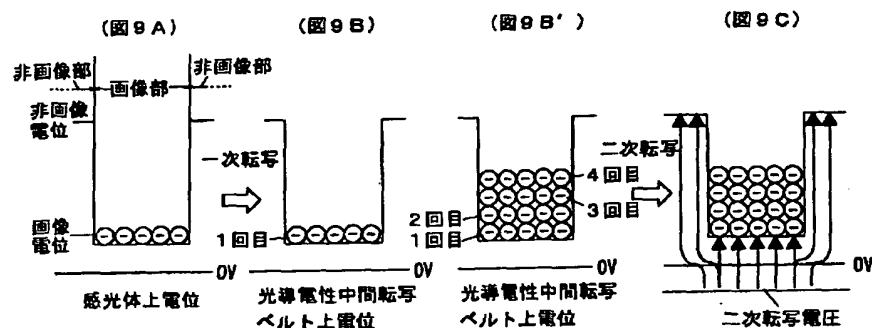
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【図 8】



【図 9】



フロントページの続き

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BA21 BA26 CA02 CA13
2H072 AA36 AB18 AB19 AB20 BA03
BA12 CA01 CA02 CA05

IMAGE FORMING DEVICE

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Equivalents:

Abstract

PROBLEM TO BE SOLVED: To reduce a potential difference between a part where toner is transferred at secondary transfer and a non-image part where the toner is not transferred, and to prevent a transfer electric field from extending to the non-image part.

SOLUTION: The device is provided with an image carrier PR having a surface on which a toner image is formed, and an intermediate transfer body B containing photoconductive material whose resistance value is reduced when the material is irradiated with light, and functioning as a high-resistance dielectric body when the body is not irradiated with light. Besides, the device is provided with a primary transfer device T1 for primarily transferring the toner image on the image carrier PR on to the intermediate transfer body B, a light irradiating/destaticizing device JK for destaticizing the intermediate transfer body B passing through a destaticizing area by the irradiation of light, a secondary transfer device T2 for secondarily transferring the primarily transferred toner image to a recording sheet S in a secondary transfer area Q4, a fixing device F for fixing the secondarily transferred image on the recording sheet passing through a fixing area Q5, and an intermediate transfer body potential adjusting device K for adjusting the potential on the intermediate transfer body B in a potential adjusting area Q6.

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CLAIMS

[Claim(s)]

[Claim 1] While passing through the image formation equipment characterized by having following requirement (A01) - (A08), an electrification (A01) field, a latent-image formation position, a development field, and a primary imprint field one by one and rotating It is charged at the time of the aforementioned electrification field passage, and an electrostatic latent image is formed at the time of latent-image formation position passage. The image support which has the front face in which a toner image is formed at the time of development field passage, the aforementioned (A02) primary imprint field, It is the middle imprint object which passes through a potential coordination area, a secondary imprint field, and an electric discharge field one by one, and rotates. The aforementioned middle imprint object which is a dielectric of high resistance in the state where contain the photoconductivity matter with which resistance falls when light is irradiated, and light is not irradiated, The sheet for record held in the medium tray The aforementioned secondary imprint field, (A03) The sheet transport device conveyed one by one in a fixing field and the sheet eccentric section, the primary imprint machine which imprints the primary toner image on an image support on a middle imprint object in the aforementioned (A04) primary imprint field, The secondary imprint machine which imprints the secondary primary imprint toner image on a middle imprint object on the aforementioned sheet for record in the aforementioned secondary imprint field, (A05) The optical irradiation electric discharge machine which discharges the middle imprint object which passes through the aforementioned electric discharge field by optical irradiation, (A06) (A07) The fixing equipment established in the secondary imprint toner image on the sheet for record which passes through the aforementioned fixing field, the middle imprint object potential regulator which adjusts the potential on a middle imprint object in the aforementioned (A08) potential coordination area.

[Claim 2] While passing through the image formation equipment characterized by having following requirement (B01) - (B09), an electrification (B01) field, a latent-image formation position, a development field, and a primary imprint field one by one and rotating It is charged at the time of the aforementioned electrification field passage, and an electrostatic latent image is formed at the time of latent-image formation position passage. The image support which has the front face in which a toner image is formed at the time of development field passage, the aforementioned (B02) primary imprint field, It is the middle imprint object which passes through a potential coordination area, a secondary imprint field, and an electric discharge field one by one, and rotates. The aforementioned middle imprint object which is a dielectric of high resistance in the state where contain the photoconductivity matter with which resistance falls when light is irradiated, and light is not irradiated, The sheet for record held in the medium tray The aforementioned secondary imprint field, (B03) The sheet transport device conveyed one by one in a fixing field and the sheet eccentric section, the primary imprint machine which imprints the primary toner image on an image support on a middle imprint object in the aforementioned (B04) primary imprint field, The optical irradiation electric discharge machine which discharges the middle imprint object which passes through the aforementioned electric discharge field by optical irradiation, (B05) The secondary imprint machine which imprints the secondary primary imprint toner

image on a middle imprint object on the aforementioned sheet for record in the aforementioned secondary imprint field, (B06) The fixing equipment established in the secondary imprint toner image on the sheet for record which passes through the aforementioned fixing field, (B07) (B08) Potential regulator control means which perform the aforementioned potential adjustment whenever the middle imprint object potential regulator and the aforementioned (B09) primary imprint which adjust the potential on a middle imprint object in the potential coordination area set up on the moving trucking of the aforementioned middle imprint object are performed.

[Translation done.]

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] this invention relates to the image formation equipment constituted so that the primary toner image especially formed on the image support might be imprinted on a middle imprint object about the image formation equipment which used electrophotography methods, such as a copying machine, facsimile, and a printer, and the secondary primary imprint toner on the aforementioned middle imprint object might be imprinted on the sheet for record.

[0002]

[Description of the Prior Art] Once imprinting the primary toner image (developed image) formed on image supports, such as a photo conductor drum, on middle imprint objects other than an imprint form as the image formation method (the imprint method) in color picture formation equipments, such as an electrophotography copying machine, the method of imprinting the 2nd order to up to an imprint form anew, and obtaining a copy image is learned. And it is known that generating of gap of the poor multiplex imprint by many factors, such as thickness of the maintenance state of an imprint form and an imprint form and the front-face nature of a lumbus and an imprint form, and color registration can be suppressed by using this method. The following conventional technology (J01) is known as image formation equipment which used the aforementioned middle imprint object.

[0003] (J01) technical drawing 8 shown in drawing 8 -- a middle imprint object -- use -- it is explanatory drawing of the image formation equipment of the bottom former Image formation equipment U is equipped with the automatic manuscript transport device U1 and the main part U2 of image formation equipment (copying machine) which has platen glass PG which supports this in drawing 8 . The aforementioned automatic manuscript transport device U1 has the manuscript delivery tray TG2 on which the manuscript Gi with which two or more manuscripts Gi which it is going to copy are conveyed by passing through the copy position on the aforementioned platen glass PG (manuscript reading station) from the manuscript medium tray TG1 laid in piles and the manuscript medium tray TG1 is discharged. The aforementioned main part U2 of image formation equipment has UI (user interface), the exposure optical system A, etc. with which a user does alter operation of the operation command signals, such as a copy start. The reflected light from the manuscript (not shown) placed on platen glass PG with the manuscript or hand control by which platen glass PG conveyance is carried out by the aforementioned automatic manuscript transport device U2 is changed into the electrical signal of R (red), G (green), and B (blue) by CCD (solid state image pickup device) through the aforementioned exposure optical system A. installation performance specification (image-processing system) changes the electrical signal of Above RGB into the image data of K (black), Y (yellow), M (Magenta), and C (cyanogen), memorizes it temporarily, and outputs the aforementioned image data to the laser drive circuit DL to predetermined timing.

[0004] The front face of the image support (photo conductor drum) PR rotated in the arrow Ya direction is uniformly charged with the electrification vessel CR in the electrification field Q0, and passes through the latent-image formation position Q1, the development field Q2, and the primary imprint field Q3 one

by one. ROS (latent-image write-in equipment) driven by the aforementioned laser drive circuit DL carries out an exposure scan in the aforementioned latent-image formation position Q1 by the laser beam L, and forms an electrostatic latent image in an image support PR front face. The electrostatic latent image corresponding to [when forming a full color picture] the picture of four colors of K (black), Y (yellow), M (Magenta), and C (cyanogen) is formed one by one, and when it is a monochrome picture, only the electrostatic latent image corresponding to K (black) picture is formed.

[0005] It rotates and the image support PR front face in which the aforementioned electrostatic latent image was formed passes through the development field Q imprint [2 or primary] field Q3 one by one. The developer G of rotary system has the development counters GK, GY, GM, and GC of four colors of K (black), Y (yellow), M (Magenta), and C (cyanogen) which rotate one by one to the aforementioned development field Q2 with rotation of the axis of rotation GA. The development counters GK, GY, GM, and GC of each aforementioned color have the development roll GR which conveys a developer to the aforementioned development field Q2, and develop the electrostatic latent image on the image support PR which passes through the development field Q2 in the toner image Tn. 2 component developer which has a toner and a carrier as a developer is used, and the toner of negative-electrode electrification nature is used as a toner of yellow, a magenta, cyanogen, and black.

[0006] Under the aforementioned image support PR, the slide frame F1 (it displays by the two-dot chain line) is supported possible [slide movement to order (direction perpendicular to space)] with the slide rails SR and SR of a right-and-left couple. The belt frame F2 of the belt module BM is supported up and down by the slide frame F1 possible [rotation] at the circumference of hinge shaft F2a. The aforementioned belt module BM has two or more belt support rolls (Rd, Rt, Rw, Rf, T2a) supported possible [a rotation of the aforementioned middle imprint belt (belt-like middle imprint object) B], the primary transfer roller T1, and the aforementioned belt frame F2 which supports them. Two or more aforementioned belt support rolls (Rd, Rt, Rw, Rf, T2a) contain the belt driving roll Rd, a tension roll Rt, the walking roll Rw, the idler roll (free roll) Rf, and back-up-roll T2a.

[0007] The imprint voltage of the electrification polarity of a toner and reversed polarity is impressed by the power circuit E which Controller C controls, and the aforementioned primary imprint machine T1 imprints the primary toner image Tn of the aforementioned image support PR front face to the middle imprint belt B in the primary imprint field Q3. In the case of a full color picture, the primary toner image Tn of each color formed in an image support PR front face one by one is imprinted one by one by the middle imprint belt B front face in piles in the aforementioned primary imprint field Q3, and, finally, a full color multiplex toner image is formed on the middle imprint belt B. In forming a monochromatic monochrome color picture, it uses only one development counter, and the primary monochrome toner image is imprinted on the middle imprint belt B. After a primary imprint, a remains toner is cleaned with the image support cleaner CLp, and an image support PR front face is discharged with the image support electric discharge vessel JR.

[0008] The secondary imprint slide frame Fs in which slide movement to order (direction perpendicular to space) is possible is supported removable to the main part of image formation equipment by the lower part of the aforementioned back-up-roll T2a with the slide rails SR and SR of a right-and-left couple. The secondary imprint rise-and-fall frame Ft of the secondary imprint unit Ut supported up and down by the aforementioned secondary imprint slide frame Fs possible [rotation] at the circumference of the hinge shaft Fta can be gone up and down between the evacuation positions which rose and which and descended. [positions] [use] The aforementioned secondary imprint unit Ut has secondary transfer roller T2b, the secondary transfer roller cleaner CL 3 and the roll support lever Lr, the sheet guide SG2 after an imprint, and the sheet conveyance belt BH and the aforementioned secondary imprint rise-and-fall frame Ft which supports them.

[0009] The aforementioned roll support lever Lr is a lever which supports the aforementioned secondary transfer roller T2b. In the state where the aforementioned secondary imprint unit Ut moved to the aforementioned operating position, it rotates to the circumference of the hinge shaft La by the motor which is not illustrated, and the aforementioned roll support lever Lr moves the aforementioned secondary transfer roller T2b between the positions in readiness distant from the secondary imprint

position and the middle imprint belt B in contact with the aforementioned middle imprint belt B. The secondary imprint field Q4 is formed of the surface of action of aforementioned secondary transfer roller T2b and the aforementioned middle imprint belt B, and the secondary imprint machine T2 is constituted by metal electrode roll T2c which contacts aforementioned secondary transfer roller T2b, aforementioned back-up-roll T2a, and back-up-roll T2a.

[0010] To predetermined timing, it is taken out by the pick up roll Rp, and sells, one sheet dissociates at a time with Roll Rs, and record sheet S held in the medium tray TR1 is conveyed by the register roll Rr. Record sheet S conveyed by the aforementioned register roll Rr doubles timing with the multiplex toner image or monochrome toner image imprinted [aforementioned] the 1st order moving to the secondary imprint field Q4, and is conveyed from the sheet guide SG1 before an imprint to the secondary imprint field Q4. In case record sheet S passes through the aforementioned secondary imprint field Q4, secondary imprint voltage of the electrification polarity of a toner and like-pole nature is impressed to electrode roll T2c of the secondary imprint machine T2 from the power circuit E which Controller C controls. The aforementioned secondary imprint machine T2 bundles up the color toner image imprinted in piles by the primary aforementioned middle imprint belt B in the aforementioned secondary imprint field, and imprints it the 2nd order to record sheet S. As for the middle imprint belt B after a secondary imprint, a remains toner is removed by the belt cleaner CLb. Moreover, as for the aforementioned secondary transfer roller T2b, a surface adhesion toner is recovered by the secondary transfer roller cleaner CL 3.

[0011] In addition, aforementioned secondary transfer roller T2b and the belt cleaner CLb are arranged free [a disjunction (isolation and contact)] to the middle imprint belt B, and they are being isolated from the middle imprint belt B until the primary non-established toner image of the last color is imprinted by the middle imprint belt B, when a color picture is formed. The aforementioned record sheet S by which the secondary toner image was imprinted is conveyed to the fixing field Q5 with the after [an imprint] sheet guide SG2, and the sheet conveyance belt BH, and in case it passes through the fixing field Q5, heating fixing of it is carried out by the fixing equipment F which has the fixing roll of the couple constituted by a heating roller Fh and the pressure roll Fp. Record sheet S fixed to the toner image is discharged by the record sheet ecrisis tray TR2. The sheet transport device SH is constituted by the element shown with the aforementioned signs Rp, Rs, Rr, SG1, SG2, and BH.

[0012]

[Problem(s) to be Solved by the Invention] (Trouble of the aforementioned conventional technology (J01)) In the image formation equipment using the middle imprint object of the aforementioned conventional technology (J01), what distributed fillers, such as a carbon metallurgy group compound, as an electric conduction agent in polymeric materials until now is used for the middle imprint object (refer to JP,8-320622,A). However, it is known that there is a close relation to the resistance of a middle imprint object and the quality of image of a toner image which were formed in this way, if resistance is too low, spilling of the toner at the time of an imprint will occur remarkably, and quality of image will deteriorate (refer to JP,08-248779,A). When the resistance of a middle imprint object is too low, since imprint electric field become easy to be built over a field without a toner layer in an operation of the imprint electric field by the primary transfer roller, and imprint current, an imprint field spreads, and it thinks because a toner will scatter and will be imprinted by the operation.

[0013] Moreover, when the resistance of a middle imprint object is high, further, in the case of a dielectric etc., the charge maintenance nature of the middle imprint object in a toner picture field can increase, and electric field required for an imprint can be appropriately impressed to it to a toner. On the other hand, in order that the charge transfer of the middle imprint body surface of the adjoining non-picture section and the interior may decrease, in the primary secondary imprint, the toner imprint to this field stops being able to happen easily. When the resistance of a middle imprint object is high, in the case of a dielectric etc., the toner formation image of quality of image with it is further obtained by this. [there is little spilling of a toner and good] However, since a charge is accumulated on a middle imprint object after a toner imprint in this case, if it remains as it is, a bad influence will be done at the time of the next image formation. Moreover, the following troubles are mentioned though the average resistance

of a middle imprint object suits good resistance width of face. That is, when fillers, such as a carbon metallurgy group compound, are distributed to a macromolecule resin, it is what low resistance-ization of the middle imprint object by dielectric breakdown of the macromolecule resin section between about 1 or more figures, a large thing, and fillers with the very small resistance variation of the middle imprint inside of the body resulting from the distributed state of a filler, the rearrangement of the filler by energization, etc. passes, and happens by the time. Thus, resistance of a middle imprint object separated from partial or resistance width of face good on the whole, and there was a problem of reducing picture quality remarkably.

[0014] Then, we proposed the middle imprint object which has a photoconductivity by Japanese Patent Application No. No. (publication-number - number official report) 123999 [ten to]. Unlike the middle imprint object of resistance, this has the high resistance as a dielectric at the time of the 1st and a secondary imprint, while distributing electric conduction powder, such as conventional carbon black. For this reason, a good picture can be acquired, without electric field spreading at the time of the 1st and a secondary imprint. and the thing done for the optical irradiation of the middle imprint object top after a secondary imprint although a charge is accumulated by imprint electric field on a middle imprint object after the 1st and a secondary imprint, respectively -- non-contact -- and a charge can be discharged, without generating ozone etc.

[0015] Drawing 9 is aforementioned Japanese Patent Application No. No. () 123999 [ten to]. [publication-number -] In drawing showing the toner image in the case of using a photoconductivity middle imprint object of high resistance like a number official report, and imprinting a toner image on a middle imprint object from an image support (photo conductor), and the potential of the circumference Drawing in which drawing 9 A shows the potential on an image support, drawing in which drawing 9 B shows the potential on a middle imprint object, drawing in which drawing 9 B' shows the potential of a middle imprint body surface after the 4th primary imprint, and drawing 9 C are drawings showing secondary imprint electric field. In drawing 9 A and drawing 9 B, the potential distribution which photo conductors also including the toner image which is the imprint purpose had at the time of a primary imprint as an imprint property of this photoconductivity middle imprint object of having high resistance at the time of an imprint is also imprinted on the middle imprint object at the time of a primary imprint. For this reason, the surrounding non-picture section potential is high from the picture section containing the toner image imprinted on the middle imprint object, and a toner image does not have it being restrained and scattering on the outskirts.

[0016] (The 1st trouble) In drawing 9 B', if a primary imprint is performed to the 1st time - the 4th time, an imprint toner image will become large at - side. In drawing 9 C, to the potential difference of the surface potential of a secondary transfer roller, and the picture section, when large, secondary imprint electric field spread [the potential difference of the surface potential (secondary imprint voltage) of a secondary transfer roller, and the non-picture section of a middle imprint object] in the non-picture section, and the imprint electric field of the picture section are falling. That is, in order that, as for imprint electric field, the resistance of a form might spread in the non-picture section with the large potential difference in the high-humidity/temperature lower etc. at the time of the secondary imprint of a low case and a toner might also scatter especially as the 1st problem in the aforementioned photoconductivity middle imprint object, it was difficult for bleeding of a picture to occur and to acquire a good picture.

[0017] (The 2nd trouble) Also in the middle imprint object which contains the photoconductivity matter as the 2nd problem, final toner imprint efficiency is of the same grade as the case where the middle imprint object of the conventional inside resistance is used, and realizing further high imprint efficiency from the structure of a picture, the repeatability of a color, and a viewpoint of a running cost has been called for.

(The 3rd trouble) As the 3rd trouble, since it had the high resistance as a dielectric at the time of a primary imprint, this middle imprint object needed to make primary imprint voltage high one by one henceforth [2nd amorous-glance], when imprinting a toner picture on a middle imprint object over multiple times, such as the time of color picture formation. For this reason, especially, the high voltage

was impressed at the time of the primary imprint of the last color toner, and a power supply with a more big capacity is required, and it had become the factor which raises cost.

[0018] this invention makes a technical problem the following (O01) and the written contents of (O02) in view of the above-mentioned situation (and examination result) in the image formation equipment which used the middle imprint object containing the photoconductivity matter.

(O01) Prevent the breadth to the non-picture section of imprint electric field by making small the potential difference of the picture section at the time of a secondary imprint (portion which imprints a toner), and the non-picture section (the portion which does not imprint a toner, background of a picture).

(O02) When you imprint the primary toner image of a different color on a middle imprint object in piles, enable it to perform a primary imprint good by primary imprint power supplies of a low battery.

[0019]

[Means for Solving the Problem] Next, although this invention thought out in order to solve the aforementioned technical problem is explained, in order to make easy correspondence with the element of the below-mentioned example, what surrounded the sign of the element of an example in the parenthesis is appended to the element of this invention. In addition, the reason for making this invention correspond with the sign of the below-mentioned example, and explaining it is for making an understanding of this invention easy, and is not for limiting the range of this invention to an example.

[0020] In order to solve the above 1st and the 2nd trouble, (The 1st invention) The image formation equipment of the 1st invention While passing through the electrification (A01) field (Q0) characterized by having following requirement (A01) - (A08), a latent-image formation position (Q1), a development field (Q2), and a primary imprint field (Q3) one by one and rotating It is charged at the time of the aforementioned electrification field (Q0) passage, and an electrostatic latent image is formed at the time of latent-image formation position (Q1) passage. The image support which has the front face in which a toner image is formed at the time of development field (Q2) passage (PR), It is the middle imprint object (B) which passes through the aforementioned primary imprint field (Q3), a potential coordination area (Q6), a secondary imprint field (Q4), and an electric discharge field (Q7) one by one, and rotates. (A02) The aforementioned middle imprint object which is a dielectric of high resistance in the state where contain the photoconductivity matter with which resistance falls when light is irradiated, and light is not irradiated (B), The sheet for record (S) held in the medium tray (TR1) The aforementioned secondary imprint field (Q4), (A03) The sheet transport device conveyed one by one in a fixing field (Q5) and the sheet discharge section (SH), The primary imprint machine which imprints the primary toner image on an image support (PR) on a middle imprint object (B) in the aforementioned primary imprint field (Q3) (T1), (A04) The secondary imprint machine which imprints the secondary primary imprint toner image on a middle imprint object (B) on the aforementioned sheet for record (S) in the aforementioned secondary imprint field (Q4) (T2), (A05) The optical irradiation electric discharge machine which discharges the middle imprint object (B) which passes through the aforementioned electric discharge field (Q7) by optical irradiation (JK), (A06) (A07) The fixing equipment (F) established in the secondary imprint toner image on the sheet for record (S) which passes through the aforementioned fixing field (Q5), the middle imprint object potential regulator which adjusts the potential on a middle imprint object (B) in the aforementioned (A08) potential coordination area (Q6) (K).

[0021] (Operation of the 1st invention) With the image formation equipment of the 1st invention equipped with the aforementioned composition The front face of an image support (PR) which passes through an electrification field (Q0), a latent-image formation position (Q1), a development field (Q2), and a primary imprint field (Q3) one by one, and is rotated It is charged at the time of the aforementioned electrification field (Q0) passage, an electrostatic latent image is formed at the time of latent-image formation position (Q1) passage, and a toner image is formed at the time of development field (Q2) passage. The photoconductivity matter with which resistance falls when light is irradiated is contained, and in the state where light is not irradiated, the aforementioned middle imprint object (B) which is a dielectric of high resistance passes through the aforementioned primary imprint field (Q3), a potential coordination area (Q6), a secondary imprint field (Q4), and an electric discharge field (Q7) one

by one, and rotates. A sheet transport device (SH) conveys the sheet for record (S) held in the medium tray (TR1) one by one in the aforementioned secondary imprint field (Q4), a fixing field (Q5), and the sheet discharge section.

[0022] A primary imprint machine (T1) imprints the primary toner image on an image support (PR) on a middle imprint object (B) in the aforementioned primary imprint field (Q3). An optical irradiation electric discharge machine (JK) discharges the middle imprint object (B) which passes through the aforementioned electric discharge field (Q7) by optical irradiation. A secondary imprint machine (T2) imprints the secondary primary imprint toner image on a middle imprint object (B) on the aforementioned sheet for record (S) in the aforementioned secondary imprint field (Q4). Fixing equipment (F) is established in the secondary imprint toner image on the sheet for record (S) which passes through the aforementioned fixing field (Q5). In the aforementioned potential coordination area (Q6), a middle imprint object potential regulator (K) adjusts the potential on a middle imprint object (B).

[0023] While distributing conductive fillers, such as carbon black proposed conventionally, unlike the middle imprint object of resistance, the photoconductivity middle imprint object (B) holds the high resistance as a dielectric at the time of the 1st and a secondary imprint. For this reason, after a primary imprint, a photoconductivity middle imprint body surface will also have the potential distribution which the photo conductor held at the time of image formation like drawing 5 A and drawing 5 B. In the case of reversal development, since the toner picture circumference formed on the middle imprint object (B) is in the state where potential is more high, primary good imprint images are obtained, without scattering imprint toner images on the outskirts.

[0024] However, in the state where the resistance of a form is low, secondary imprint electric field will be in the non-picture section in an extended state (refer to drawing 9 C) especially under high-humidity/temperature, and since a toner is imprinted in the form where the breadth of this electric field is met, it becomes difficult to acquire a good picture. Therefore, it can imprint to the last imprint material, such as paper, without being able to stop the breadth of the imprint electric field at the time of a secondary (refer to drawing 5 C) imprint, and scattering toner pictures by carrying out optical irradiation to a photoconductivity middle imprint object, and making small the surface potential of the non-picture section of a photoconductivity middle imprint object, and the surface potential of the toner picture section after a primary imprint and before a secondary imprint, on it. However, if optical irradiation is carried out so that potential of the non-picture section is made lower than the potential of the picture section in this case, toner layers will be scattered by the electric field from the repulsive force and the non-picture section of the toners charged to like-pole nature, and it will become the picture which scattered on the outskirts.

[0025] Furthermore, a corona discharge phenomenon can be used as an option. In this case, it is the method of leveling near the direct-current-voltage value which superimposes and impresses the voltage of an alternating current and a direct current to corotron, and impresses a middle imprint body surface to corotron. For example, a photo conductor and a middle imprint belt set the direct current voltage impressed to corotron by the case of reversal development by negative electrification nature as the middle potential of the picture section on a middle imprint belt, and the non-picture section. Drawing 6 is explanatory drawing of the mechanism of the potential adjustment at the time of using corotron as a middle imprint object potential regulator. Drawing 6 A the direct current voltage impressed to corotron The picture section on a middle imprint belt, Explanatory drawing in the state where the potential of the picture section at the time of setting it as the middle potential of the non-picture section and the non-picture section changes, Drawing 6 B is drawing showing the potential state of the picture section after drawing and the drawing 6 C potential which show signs that the potential of the picture section and the non-picture section changes change, and the non-picture section, when corotron carries out corona discharge. In drawing 6, it is charged to near [where the current of a minus component flowed and impressed the direct current voltage impressed to corotron to the picture section with potential lower than the direct-current-voltage value VDC of corotron by setting it as the middle potential of the picture section on a middle imprint belt, and the non-picture section] the direct-current-voltage value VDC.

Moreover, the current of a plus component can lower to the non-picture section with potential higher than the direct-current-voltage value VDC of corotron to near [which was flowed and impressed] the direct-current-voltage value VDC. In this case, the state of drawing 6 B will be in the state of drawing 6 C by the corona discharge by the aforementioned corotron.

[0026] Since the difference of the potential level of the picture section and the non-picture section becomes small by these things, even if it carries out a secondary imprint in the form with which resistance fell under high-humidity/temperature, spilling of the breadth of electric field, i.e., an imprint toner, can be suppressed. Moreover, since the charge is further added to the toner layer of the picture section at this time, imprint electric field become stronger and can improve imprint efficiency. Since a charge falls, by changing to reversed polarity, the fogging toner which is furthermore in the non-picture section can suppress the imprint of a fogging toner.

[0027] In order to solve the 3rd trouble of the above, (The 2nd invention) The image formation equipment of the 2nd invention While passing through the electrification (B01) field (Q0) characterized by having following requirement (B01) - (B09), a latent-image formation position (Q1), a development field (Q2), and a primary imprint field (Q3) one by one and rotating It is charged at the time of the aforementioned electrification field (Q0) passage, and an electrostatic latent image is formed at the time of latent-image formation position (Q1) passage. The image support which has the front face in which a toner image is formed at the time of development field (Q2) passage (PR), It is the middle imprint object (B) which passes through the aforementioned primary imprint field (Q3), a potential coordination area (Q6), a secondary imprint field (Q4), and an electric discharge field (Q7) one by one, and rotates. (B02) The aforementioned middle imprint object which is a dielectric of high resistance in the state where contain the photoconductivity matter with which resistance falls when light is irradiated, and light is not irradiated (B), The sheet for record (S) held in the medium tray (TR1) The aforementioned secondary imprint field (Q4), (B03) The sheet transport device conveyed one by one in a fixing field (Q5) and the sheet discharge section (SH), The primary imprint machine which imprints the primary toner image on an image support (PR) on a middle imprint object (B) in the aforementioned primary imprint field (Q3) (T1), (B04) The optical irradiation electric discharge machine which discharges the middle imprint object (B) which passes through the aforementioned electric discharge field (Q7) by optical irradiation (JK), (B05) The secondary imprint machine which imprints the secondary primary imprint toner image on a middle imprint object (B) on the aforementioned sheet for record (S) in the aforementioned secondary imprint field (Q4) (T2), (B06) The fixing equipment established in the secondary imprint toner image on the sheet for record (S) which passes through the aforementioned fixing field (Q5) (F), (B07) (B08) Potential regulator control means which perform the aforementioned potential adjustment whenever the middle imprint object potential regulator (K) and the aforementioned (B09) primary imprint which adjust the potential on a middle imprint object (B) in the potential coordination area (Q6) set up on the moving trucking of the aforementioned middle imprint object (B) are performed (C7').

[0028] (Operation of the 2nd invention) With the image formation equipment of the 2nd invention equipped with the aforementioned composition The front face of an image support (PR) which passes through an electrification field (Q0), a latent-image formation position (Q1), a development field (Q2), and a primary imprint field (Q3) one by one, and is rotated It is charged at the time of the aforementioned electrification field (Q0) passage, an electrostatic latent image is formed at the time of latent-image formation position (Q1) passage, and a toner image is formed at the time of development field (Q2) passage. The photoconductivity matter with which resistance falls when light is irradiated is contained, and in the state where light is not irradiated, the middle imprint object (B) which is a dielectric of high resistance passes through the aforementioned primary imprint field (Q3), a potential coordination area (Q6), a secondary imprint field (Q4), and an electric discharge field (Q7) one by one, and rotates. A sheet transport device (SH) conveys the sheet for record (S) held in the medium tray (TR1) one by one in the aforementioned secondary imprint field (Q4), a fixing field (Q5), and the sheet discharge section.

[0029] A primary imprint machine (T1) imprints the primary toner image on an image support (PR) on a middle imprint object (B) in the aforementioned primary imprint field (Q3). An optical irradiation

electric discharge machine (JK) discharges the middle imprint object (B) which passes through the aforementioned electric discharge field (Q7) by optical irradiation. In the aforementioned secondary imprint field (Q4), a secondary imprint machine (T2) imprints the secondary primary imprint toner image on a middle imprint object (B) on the aforementioned sheet for record (S). Fixing equipment (F) is established in the secondary imprint toner image on the sheet for record (S) which passes through the aforementioned fixing field (Q5).

[0030] In the potential coordination area (Q6) set up on the moving trucking of the aforementioned middle imprint object (B), a middle imprint object potential regulator (K) adjusts the potential on a middle imprint object (B). Potential regulator control means (C7') perform the aforementioned potential adjustment, whenever the aforementioned primary imprint is performed. Optical irradiation or corona discharge can perform the aforementioned potential adjustment.

[0031] That is, the photo conductor potential distribution at the time of the image formation imprinted by the middle imprint object (B) can be adjusted by carrying out optical irradiation on a middle imprint object (B) after the aforementioned primary imprint. Potential level at this time is carried out to more than the level that united the potential of the middle imprint body surface of the picture section, and the toner image potential currently formed on it. If potential of the non-picture section is made low like the time of a secondary imprint also in this case, a toner image will scatter on the outskirts. By lowering the middle imprint object potential level under primary imprint, even when imprinting the toner image after 2 amorous glance, it can prevent that primary imprint voltage rises greatly. When potential adjustment of the middle imprint body surface is carried out also including a toner layer by the electric discharge phenomenon by corotron etc., it can prevent that can lower the potential as the whole middle imprint object (B) similarly, and primary imprint voltage rises greatly. In addition, the potential of the picture section on a middle imprint object (B) and the non-picture section changes by setup of the primary secondary imprint, and should just also set up the potential adjusted by corotron etc. if needed at any time.

[0032]

[The form of operation] (Form 1 of operation) The form 1 of operation of the image formation equipment of this invention is the aforementioned middle imprint object potential regulator which is characterized by having the following requirements (AB01) in the above 1st or the 2nd invention and which was constituted by the middle (AB01) imprint object (B) with the optical irradiation vessel which irradiates light (K).

[0033] (Operation of the form 1 of operation) The aforementioned middle imprint object potential regulator (K) is constituted from a form 1 of the operation of the image formation equipment of this invention which offered the aforementioned composition by the middle imprint object (B) with the optical irradiation vessel which irradiates light. The aforementioned middle imprint object (B) containing the photoconductivity matter can adjust the potential of a twist to optical irradiation.

[0034] (Form 2 of operation) The form 2 of operation of the image formation equipment of this invention is the aforementioned middle imprint object potential regulator which is characterized by having the following requirements (AB02) in the above 1st or the 2nd invention and which was constituted with the corona discharge (AB02) vessel (K).

[0035] (Operation of the form 2 of operation) The aforementioned middle imprint object potential regulator (K) is constituted from the form 2 of the operation of the image formation equipment of this invention which offered the aforementioned composition by the corona discharge machine. The aforementioned middle imprint object (B) can adjust potential with a corona discharge vessel.

[0036] (Example) Although the example (example) of the form of operation of this invention is explained referring to a drawing next, this invention is not limited to the following examples.

[0037] (Example 1) Drawing 1 is the whole image formation equipment explanatory drawing of the example 1 of this invention. In explanation of the image formation equipment U of this example 1 shown in drawing 1, to the same component as the component of the conventional image formation equipment shown in aforementioned drawing 8, the same sign as the sign used by aforementioned drawing 8 is given, and the detailed explanation is omitted to it. the conventional image formation

equipment which showed the example 1 of the image formation equipment of this invention shown in drawing 1 to aforementioned drawing 8 , and abbreviation -- although constituted identically, it is different in respect of the following

[0038] The middle imprint object potential regulator K constituted by Red Light Emitting Diode (optical irradiation machine) is arranged at the potential coordination area Q6 set as the conveyance direction upstream of the middle imprint belt B of the secondary imprint field Q4 of the image formation equipment shown in aforementioned drawing 1 . On both sides of the middle imprint belt B, the ground roll (grounded roll) Re is arranged in the aforementioned middle imprint object potential regulator K and the position which counters. The potential of the middle imprint belt B is adjusted by the optical irradiation by the aforementioned middle imprint object potential regulator K. In the middle imprint object electric discharge field Q7 set as the conveyance direction downstream of the middle imprint belt B of the secondary imprint field Q4 of the image formation equipment shown in aforementioned drawing 1 , the optical irradiation electric discharge machine JK constituted by Red Light Emitting Diode (optical irradiation machine) is arranged. On both sides of the middle imprint belt B, the aforementioned optical irradiation electric discharge machine JK and the idler roll Re grounded to the position which counters are arranged. The middle imprint belt B is discharged in the middle imprint object electric discharge field Q7 by the optical irradiation with the aforementioned optical irradiation electric discharge machine JK. The voltage impressed to the aforementioned middle imprint object potential regulator K and the optical irradiation electric discharge machine JK is supplied from a power circuit E (not shown [refer to drawing 1 and wiring]).

[0039] (Secondary imprint machine T2) between the contiguity positions distant from the aforementioned back-up-roll T2a and this back-up-roll T2a which and are pressed -- a disjunction -- being possible (isolation and approach being possible) -- the secondary imprint machine T2 is constituted by arranged secondary transfer roller T2b and metal electrode roll T2c which contacts the aforementioned back-up-roll T2a [positions] [isolation] The aforementioned back-up-roll T2a twists the elastic body of half-conductivity around a conductive metal roll, and is constituted, for example, the surface resistivity is adjusted $1 \times 10^7 \text{ohms} / \text{more than } **$. Moreover, secondary transfer roller T2b by which the ground was carried out [aforementioned] wraps the front face of a metal roll in carbon part scattering gun urethane, and the clothing of the outside is carried out with the thin layer film of half-conductivity, for example, the volume resistivity is adjusted to 10^9-ohmcm .

[0040] ((B) Middle imprint belt) Drawing 2 is drawing showing the composition of the middle imprint belt currently used in the example 1 of the image formation equipment of this invention. The middle imprint belt (belt-like middle imprint object) B currently used in the example 1 of the aforementioned image formation equipment is constituted as follows. In drawing 2 , the aforementioned middle imprint belts B are four layer structures, and the laminating of the belt base material B1, blocking layer B-2a, charge generating layer B-2b, and the charge transporting-bed B-2c is carried out one by one toward the front-face side from the rear face. In addition, photoconduction layer B-2 is constituted by aforementioned charge generating layer B-2b and charge transporting-bed B-2c.

(Belt base material B1) It is constituted by the polyimide resin which added the carbon black 15% of the weight, and is formed in 75 micrometers of thickness. A volume resistivity is set as $10^9.5\text{-ohmcm}$ and surface electrical resistance is set as $10^{12}\text{ohms} / **$.

[0041] (Blocking layer B-2a) a blocking layer (B-2a) -- for example, it can form as follows Acetylacetone zirconium butoxide (ORUGACHIKKUSU ZC540, the Matsumoto intersection trading company make) 20 weight sections gamma-aminopropyl triethoxysilane 2 weight sections polyvinyl butyral resin (S REKKU BM-S, Sekisui Chemical Co., Ltd. make)

1.5 weight section n-butyl alcohol After applying to a base-material (B1) front face, it is made to dry, for example, the solution which consists of the 70 weight sections above-mentioned component is formed in 0.9 micrometers. The aforementioned blocking layer (B-2a) - (minus) Although the electron transfer which is a polar carrier allows, movement of the hole which is + (plus) polarity carrier has the function to prevent.

[0042] (Charge generating layer B-2b) It is the layer of 0.25 micrometers of thickness formed of PVK

(Poly vinyl carbazole, polyvinyl-carbazole) which added the phthalocyanine-pigment system charge generating agent. If light is irradiated, the charge of + (plus) and - (minus) will be generated.

[0043] (Charge transporting-bed (hole transporting bed) B-2c) It is constituted by the polycarbonate resin which added the triphenylamine system charge transportation agent, and is 25 micrometers of thickness. + (Plus) Although movement of the hole which is a polar carrier is allowed, the electron transfer which is - (minus) polarity carrier has the function to prevent. That is, charge transporting-bed B-2c of this example 1 is a hole transporting bed.

[0044] (Explanation of the control section of an example 1) Drawing 3 is the block diagram of the control section of the aforementioned example 1. UI (user interface) is connected to the aforementioned controller C, and UI has the copy start key (job start key) UIa, the full color mode selection key UIb, the ten key UIc, Drop UId, etc. The detecting signal of the following sensor is inputted into the aforementioned controller C.

SNB: The belt position sensor belt position sensor SNB (refer to drawing 1 and drawing 3) detects the mark (mark) attached to the middle imprint belt B, and outputs a detecting signal to the aforementioned controller C.

SN1: SHITOSAIZUSENSA SHITOSAIZUSENSA SN1 is a sensor of a detection sake about the existence and the paper size (sheet size) of sheet (form) passage, and outputs a detecting signal to the aforementioned controller C. In addition, the detecting signal of the delivery sensor which is not illustrated, a fixing equipment temperature sensor, and other sensors is inputted into the aforementioned controller C.

[0045] Above UI (user interface), the various aforementioned sensors SNB and SN1, and the aforementioned controller C into which the signal from -- is inputted The operation timing-control signal of Above installation performance specification, the operation timing-control signal of the laser driving-signal output unit DL, The operation control signal of the power circuit E2 for the power circuit E imprint [1 or secondary] for the primary imprint of the belt driving circuit D and power circuit E which drive the belt driving motor M for carrying out the rotation drive of the middle imprint belt B, the power supply E3 for middle imprint object potential adjustment, and electric discharge dexterous power circuit E4 grade is outputted. According to the control signal which the aforementioned controller C outputs, the power supply E3 for middle imprint object potential adjustment drives the aforementioned middle imprint object potential regulator K, and the electric discharge dexterous power circuit E4 drives the optical irradiation electric discharge machine JK.

[0046] The aforementioned controller C which performs processing according to the aforementioned various input signals I/O which performs I/O of a signal with the exterior, regulation of I/O signal level, etc. (input/output interface), ROM a program, data, etc. for performing required processing were remembered to be (read only memory), RAM for memorizing required data temporarily (RAM), It is constituted by the row by computer which has CPU (arithmetic and program control) which performs input/output control, data processing, etc. according to the program memorized by Above ROM, and various functions can be realized by executing the program memorized by Above ROM. That is, Controller C has the following function.

[0047] C1: The belt position detection means belt position detection means C1 has detected the rotation position of the middle imprint belt B, when the aforementioned belt position sensor SNB measures the elapsed time from the time which detected the aforementioned belt mark MK.

C2: The sheet size detection means sheet size detection means C2 detects the sheet size of the sheet (form) conveyance direction by the passage time of the sheet (form) nose of cam and the back end which the aforementioned sheet size sensor SN1 detects.

[0048] C3: The notice signal output means C3 of notice signal output means of write-in timing write-in timing is outputting the notice signal of write-in timing to Above installation performance specification and the laser driving-signal output unit DL based on the belt mark detection signal of the aforementioned belt position sensor SNB. That is, since the toner image imprint starting position on the middle imprint belt B arrives at the aforementioned primary imprint field Q3 after a predetermined time, it is necessary to make the front end of the toner image which doubles timing with it and is formed on

the image support PR arrive at the aforementioned primary imprint position Q3, after the aforementioned belt position sensor SNB detects a belt mark. For that purpose, it is necessary to start the picture writing to the latent-image formation position Q1 by Above ROS to predetermined timing. For this reason, the notice signal output means C3 of write-in timing is outputting the aforementioned notice signal of write-in timing. In addition, Above installation performance specification and the laser driving-signal output unit DL output a laser driving signal to ROS from the laser driving-signal output unit DL to predetermined timing, after the aforementioned notice signal of write-in timing is outputted.

[0049] C4: Belt control-means belt control means output the control signal of the belt driving circuit D of the belt driving motor M by which C4 carries out the rotation drive of the aforementioned middle imprint belt B.

Primary C 5:1st imprint machine control-means imprint machine control means C5 impress fixed primary imprint current or fixed voltage to the primary imprint machine T1, in case the image formation field of the middle imprint belt B passes through the primary imprint field Q3.

In case the image formation field of the middle imprint belt B passes through the secondary imprint field Q3, secondary C 6:2nd imprint machine control-means imprint machine control means C6 impress fixed secondary imprint current or fixed voltage to the secondary imprint machine T2 in order to perform a secondary imprint.

[0050] C7: The potential regulator control-means potential regulator control means C7 output the lighting control signal of the middle imprint object potential regulator (red Light Emitting Diode) K which adjusts the potential of the middle imprint belt B front face which passes the potential coordination area Q6 of secondary imprint field Q4 upstream of the middle imprint belt B.

[0051] C8: In case the portion into which the secondary imprint of the middle imprint belt B was performed passes through the electric discharge field Q7, the electric discharge machine lighting control-means electric discharge machine lighting control means C8 output an electric discharge machine lighting control signal to the aforementioned electric discharge dexterous power circuit E4 (refer to drawing 3) so that the aforementioned optical irradiation electric discharge machine JK may be turned on.

[0052] The light source control circuit (C+E4) is constituted by Controller C and the electric discharge dexterous power circuit E4 which have the aforementioned electric discharge machine lighting control means C7. The resistivity control unit (C+E4+JK) is constituted by Controller C and the electric discharge dexterous power circuit E4 which have the aforementioned electric discharge machine lighting control means C7, and the optical irradiation electric discharge machine JK.

[0053] (Operation timing of the potential regulator K and the optical irradiation electric discharge machine JK) Drawing 4 is the timing diagram of the primary imprint machine T1 of an example 1, the middle imprint object potential regulator K, the secondary imprint machine T2, and the optical irradiation electric discharge machine JK. In drawing 4 , the middle imprint object potential regulator K of the image formation equipment of this example 1 is controlled to perform potential adjustment of the photoconductivity middle imprint object by optical irradiation before a secondary imprint after the primary imprint end of multiple times (after the primary imprint end of the last imprint toner image in the toner image of four colors). Moreover, the aforementioned optical irradiation electric discharge machine JK is controlled to discharge the middle imprint belt B by optical irradiation after a secondary imprint end.

[0054] (Operation of an example 1) Next, the image formation equipment of this example 1 is used, and the operation at the time of performing image formation operation under high-humidity/temperature (28 degrees C, 85%) is explained.

(Form) The form was kept under high-humidity/temperature (28 degrees C, 85%) for 12 hours, and was changed into the state where resistance fell enough. Volume resistivity of the form at this time When measured in Kethly 487 Picoammeter and 8009 Resistivity test fixture, it was 4.58×10^8 ohm-cm.

[0055] (Primary imprint voltage) Table 1 is a table showing required primary transfer roller direct-current applied voltage and primary transfer roller direct-current applied voltage required in with exposure of the below-mentioned examples 3 and 4, when you have no exposure after the primary

imprint of examples 1 and 2.

[Table 1]

(表 1) 1 次転写ロール直流印加電圧

	1 次転写後の露光	
	無	有
1 次転写 1cycle 後	380V	380V
1 次転写 2cycle 後	480V	410V
1 次転写 3cycle 後	650V	460V
1 次転写 4cycle 後	800V	490V

1 次転写電流 : 6 μ A

As shown in Table 1, in order to 6microA Pass primary imprint current, voltage higher than a case with the exposure after a primary imprint (the below-mentioned example 3, four references) is required for the right voltage (voltage in the case of having no exposure) impressed to the primary transfer roller T1 of an example 1.

[0056] Table 2 is a table showing primary imprint voltage and middle imprint body surface potential in the case (when you have no adjustment of the potential regulator K) of having no exposure after the primary imprint of examples 1 and 2, and primary imprint voltage required in with exposure of the below-mentioned example 3 and middle imprint body surface potential.

[Table 2]

(表 2) 光導伝性中間転写体の表面電位と一次転写電圧

	1 次転写後の露光無し		1 次転写後の露光有り	
	中間転写体表面電位	1 次転写電圧	中間転写体表面電位	1 次転写電圧
1 次転写 1cycle 後	-125V	380V	-90V	380V
1 次転写 2cycle 後	-300V	480V	-185V	410V
1 次転写 3cycle 後	-450V	650V	-260V	460V
1 次転写 4cycle 後	-625V	800V	-350V	490V
2 次転写前露光後	-400V	—	—	—
2 次転写後	-110V	—	-80V	—
2 次転写後露光後	-20V	—	-15V	—

[0057] The primary transfer roller direct-current applied voltage when impressing the right voltage of the constant current control of 6microA to the aforementioned primary transfer roller T1, and changing applied voltage from one amorous glance one by one up to four amorous glance is as being shown in the aforementioned table 1, and the non-picture section potential of a middle imprint body surface is as follows (refer to Table 2).

After 1 amorous-glance imprint: It is :-625V after :-300V and 3 amorous-glance imprint after -125V and 2 amorous-glance imprint at the time of :-450V and 4 amorous-glance imprint.

[0058] The non-picture section potential after exposure when the middle imprint object potential regulator K which is after the primary imprint of four amorous glance, and was constituted by Red Light Emitting Diode before the secondary imprint performs potential adjustment of a middle imprint body surface (after potential adjustment) was -400V. It is drawing showing the toner image in the case of drawing 5 using the photoconductivity middle imprint object B of high resistance of an example 1 (middle imprint belt), and imprinting a toner image on the middle imprint object B from the image support (photo conductor) PR, and the potential of the circumference. Drawing showing that potential (-potential) rises whenever it repeats a primary imprint in drawing in which drawing 5 A shows the potential on the image support PR, and drawing in which drawing 5 B shows the potential on the middle

imprint object B, Since the difference of the picture potential of a middle imprint object B front face and non-picture potential became small, drawing and drawing 5 C which shows that the potential of a middle imprint body surface falls by exposing drawing 5 B' after the 4th primary imprint is drawing showing the state where the breadth to the non-picture section of secondary imprint electric field was lost. In the state of drawing 5 C, since the breadth to the non-picture section of secondary imprint electric field was lost as compared with the aforementioned drawing 9 C, spilling of a toner etc. decreases.

(Secondary imprint voltage) In this example 1, it imprinted in the state of the aforementioned drawing 5 C by impressing the constant voltage of 1000V to secondary transfer roller T2b.

[0059] (Picture pattern) Two kinds were prepared for the picture pattern of a print sample, the 1st sheet considered as solid and the thing which made the set the kanji with which the sizes by black toner monochrome differ of 2cm angle size of yellow, a magenta, cyanogen, **** monochrome, a secondary color, and the 3rd color, and the 2nd sheet made it the 400 line(s)/inch halftone picture of black toner monochrome, and it outputted two sorts of samples by turns Although the middle imprint body surface potential of an immediately after [the secondary imprint of the print of the 1st sheet] had the surface potential nonuniformity according to the about [-100V] picture pattern from -70V After the optical irradiation with the optical irradiation electric discharge machine JK, it became almost uniform [the surface potential of a middle imprint object] from -10V to -30V, and the uniform picture which has neither concentration nonuniformity nor spilling also in the 400 line(s)/inch halftone picture which is the following print sample was acquired. Although a total of two sorts of 20000 print samples was outputted by turns, the good picture in which concentration nonuniformity, spilling, and a picture grow fat and which is not was acquired.

[0060] (Example 2) The example 2 of the image formation equipment of this invention is constituted like the aforementioned example 1 in respect of others, although it is different from the image formation equipment of the aforementioned example 1 the following point. The point which used the middle imprint object potential regulator K constituted from this example 2 by SUKOTORON to having used the middle imprint object potential regulator K which consisted of aforementioned examples 1 with the optical irradiation vessel. The operation timing of the middle imprint object potential regulator K of the image formation equipment of this example 2 and the optical irradiation electric discharge machine JK is the same as that of the aforementioned example 1. That is, the timing chart is the same as that of aforementioned drawing 4. That is, the middle imprint object potential regulator K is controlled to perform potential adjustment of the photoconductivity middle imprint object by optical irradiation before a secondary imprint after the primary imprint end of multiple times (after the primary imprint end of the last imprint toner image in the toner image of four colors). Moreover, the optical irradiation electric discharge machine JK is controlled so that after a secondary imprint end discharges electricity.

[0061] (Operation of an example 2) Next, the image formation equipment of this example 2 is used, and the operation at the time of performing image formation operation under high-humidity/temperature (28 degrees C, 85%) is explained.

(Form) The form used the same form as the aforementioned example 1.

(Primary imprint voltage) The right voltage of the constant current control of 6microA is impressed to the primary transfer roller T1, and it enabled it to change applied voltage from one amorous glance one by one up to four amorous glance. The non-picture section potential of the middle imprint body surface at this time was as follows.

After 1 amorous-glance imprint: It is :-625V after :-300V and 3 amorous-glance imprint after -125V and 2 amorous-glance imprint at the time of :-450V and 4 amorous-glance imprint.

[0062] The non-picture section potential after exposure when the middle imprint object potential regulator K which is after the primary imprint of four amorous glance, and was constituted by scorotron before the secondary imprint performs potential adjustment of a middle imprint body surface (after potential adjustment) was -400V.

(Secondary imprint voltage) It imprinted by impressing the constant voltage of 1000V to secondary transfer roller T2b.

[0063] (Picture pattern) Two kinds were prepared for the picture pattern of a print sample, the 1st sheet

considered as solid and the thing which made the set the kanji with which the sizes by black toner monochrome differ of 2cm angle size of yellow, a magenta, cyanogen, **** monochrome, a secondary color, and the 3rd color, and the 2nd sheet made it the 400 line(s)/inch halftone picture of black toner monochrome, and it outputted two sorts of samples by turns. Although the middle imprint body surface potential of an immediately after [the secondary imprint of the print of the 1st sheet] had the surface potential nonuniformity according to the about [-100V] picture pattern from -70V. After the potential adjustment with the optical irradiation electric discharge machine JK, it became almost uniform [the surface potential of a middle imprint object] from -10V to -30V, and the uniform picture which has neither concentration nonuniformity nor spilling also in the 400 line(s)/inch halftone picture which is the following print sample was acquired. Although a total of two sorts of 20000 print samples was outputted by turns, the good picture in which concentration nonuniformity, spilling, and a picture grow fat and which is not was acquired.

[0064] (Example 3) The example 3 of the image formation equipment of this invention is constituted like the aforementioned example 1 in respect of others, although it is different from the image formation equipment of the aforementioned example 1 the following point. With the image formation equipment of this example 3, the operation timing of the middle imprint object potential regulator K is different from the aforementioned example 1. Drawing 7 is the timing diagram of the primary imprint machine T1 of an example 3, the middle imprint object potential regulator K, the secondary imprint machine T2, and the optical irradiation electric discharge machine JK. As opposed to the middle imprint object potential regulator K of the aforementioned example 1 having been controlled to perform potential adjustment of the photoconductivity middle imprint object by optical irradiation before a secondary imprint after the primary imprint end of multiple times (after the primary imprint end of the last imprint toner image in the toner image of four colors) The middle imprint object potential regulator K of this example 3 is controlled for every primary imprint end to perform potential adjustment of the photoconductivity middle imprint object by optical irradiation to be shown in drawing 7. Control of the aforementioned middle imprint object potential regulator K is performed by potential regulator control-means C7' of the controller C of an example 3.

[0065] (Operation of an example 3) Next, the image formation equipment of this example 3 is used, and the operation at the time of performing image formation operation under high-humidity/temperature (28 degrees C, 85%) is explained.

(Form) The form used the same form as the aforementioned example 1.

(Primary imprint voltage) The right voltage of the constant current control of 6microA is impressed to the primary transfer roller T1, and it enabled it to change applied voltage from one amorous glance one by one up to four amorous glance. At this time, optical irradiation by the middle imprint object potential regulator K (red Light Emitting Diode) was performed for after [every] the primary imprint of the toner of each color, and middle imprint body surface potential was adjusted at any time. The non-picture section potential of the middle imprint body surface at this time was as follows.

After 1 amorous-glance imprint: It is :-350V after :-185V and 3 amorous-glance imprint after -90V and 2 amorous-glance imprint at the time of :-260V and 4 amorous-glance imprint.

[0066] When the aforementioned table 1 has the primary transfer roller direct-current applied voltage in with the exposure after the primary imprint of an example 3, and no exposure for comparison, required primary transfer roller direct-current applied voltage is shown. . As shown in the aforementioned table 1, the right voltage impressed to the primary transfer roller T1 is voltage lower than the case where it does not expose after a primary imprint.

[0067] Primary imprint voltage in with (in the case of with adjustment of the potential regulator K) the exposure after the primary imprint of an example 3 and middle imprint body surface potential, and primary imprint voltage required when you have no exposure for comparison and middle imprint body surface potential are shown in the aforementioned table 2.

[0068] (Secondary imprint voltage) It imprinted by impressing the constant voltage of 1000V to secondary transfer roller T2b.

[0069] (Picture pattern) Two kinds were prepared for the picture pattern of a print sample, the 1st sheet

considered as solid and the thing which made the set the kanji with which the sizes by black toner monochrome differ of 2cm angle size of yellow, a magenta, cyanogen, **** monochrome, a secondary color, and the 3rd color, and the 2nd sheet made it the 400 line(s)/inch halftone picture of black toner monochrome, and it outputted two sorts of samples by turns Although the middle imprint body surface potential of an immediately after [the secondary imprint of the print of the 1st sheet] had the surface potential nonuniformity according to the about [-80V] picture pattern from -60V After the optical irradiation with the optical irradiation electric discharge machine JK, it became almost uniform [the surface potential of a middle imprint object] from -10V to -30V, and the uniform picture which has neither concentration nonuniformity nor spilling also in the 400 line(s)/inch halftone picture which is the following print sample was acquired. Although a total of two sorts of 20000 print samples was outputted by turns, the good picture in which concentration nonuniformity, spilling, and a picture grow fat and which is not was acquired.

[0070] (Example 4) The example 4 of the image formation equipment of this invention is constituted like the aforementioned example 1 in respect of others, although it is different from the image formation equipment of the aforementioned example 1 the following point. By this example 4, the middle imprint object potential regulator K constituted by SUKOTORON is used to having used the middle imprint object potential regulator K which consisted of aforementioned examples 1 with the optical irradiation vessel. Moreover, with the image formation equipment of this example 4, the operation timing of the middle imprint object potential regulator K is different from the aforementioned example 1. Namely, the middle imprint object potential regulator K of the aforementioned example 1 As opposed to having been controlled to perform potential adjustment of the photoconductivity middle imprint object by optical irradiation before a secondary imprint after the primary imprint end of multiple times (after the primary imprint end of the last imprint toner image in the toner image of four colors) For every primary imprint end, the middle imprint object potential regulator K of this example 4 is controlled so that the corona discharge (a direct current and alternating voltage are superimposed) of scorotron performs potential adjustment of a photoconductivity middle imprint object. Therefore, the timing diagram of an example 4 is the same as that of the timing diagram (refer to drawing 7) of the aforementioned example 3.

[0071] (Operation of an example 4) Next, the image formation equipment of this example 4 is used, and the operation at the time of performing image formation operation under high-humidity/temperature (28 degrees C, 85%) is explained.

(Form) The form used the same form as the aforementioned example 1.

(Primary imprint voltage) The right voltage of the constant current control of 6microA is impressed to the primary transfer roller T1, and it enabled it to change applied voltage from one amorous glance one by one up to four amorous glance. At this time, corona discharge by the middle imprint object potential regulator (scorotron) K was performed for after [every] the primary imprint of the toner of each color, and middle imprint body surface potential was adjusted. The direct current voltage impressed to the middle imprint object potential regulator K at this time (scorotron) was as follows.

After 1 amorous-glance imprint: It is :-330V after :-175V and 3 amorous-glance imprint after -90V and 2 amorous-glance imprint at the time of :-240V and 4 amorous-glance imprint.

[0072] In this case, the non-picture section potential of the middle imprint body surface after the potential adjustment by the middle imprint object potential regulator (scorotron) K was as follows.

After 1 amorous-glance imprint: It is :-360V after :-195V and 3 amorous-glance imprint after -100V and 2 amorous-glance imprint at the time of :-270V and 4 amorous-glance imprint.

[0073] (Secondary imprint voltage) It imprinted by impressing the constant voltage of 1000V to secondary transfer roller T2b.

[0074] (Picture pattern) Two kinds were prepared for the picture pattern of a print sample, the 1st sheet considered as solid and the thing which made the set the kanji with which the sizes by black toner monochrome differ of 2cm angle size of yellow, a magenta, cyanogen, **** monochrome, a secondary color, and the 3rd color, and the 2nd sheet made it the 400 line(s)/inch halftone picture of black toner monochrome, and it outputted two sorts of samples by turns Although the middle imprint body surface potential of an immediately after [the secondary imprint of the print of the 1st sheet] had the surface

potential nonuniformity according to the about [-80V] picture pattern from -60V After the optical irradiation with the optical irradiation electric discharge machine JK, it became almost uniform [the surface potential of a middle imprint object] from -10V to -30V, and the uniform picture which has neither concentration nonuniformity nor spilling also in the 400 line(s)/inch halftone picture which is the following print sample was acquired. Although a total of two sorts of 20000 print samples was outputted by turns, the good picture in which concentration nonuniformity, spilling, and a picture grow fat and which is not was acquired.

[0075] (Example of comparison) Operation of image formation equipment which does not form the middle imprint object potential regulator K as an example of comparison is explained.

(Operation of the example of comparison) Next, the image formation equipment of the aforementioned example of comparison is used, and the operation at the time of performing image formation operation under high-humidity/temperature (28 degrees C, 85%) is explained.

(Form) The form used the same form as the aforementioned example 1.

(Primary imprint voltage) The right voltage of the constant current control of 6microA is impressed to the primary transfer roller T1, and it enabled it to change applied voltage from one amorous glance one by one up to four amorous glance. At this time, the middle imprint body surface potential after the primary imprint of the toner of each color was as follows.

After 1 amorous-glance imprint: It is :-625V after :-300V and 3 amorous-glance imprint after -125V and 2 amorous-glance imprint at the time of :-450V and 4 amorous-glance imprint.

[0076] (Secondary imprint voltage) It imprinted by impressing the constant voltage of 1000V to secondary transfer roller T2b.

[0077] (Picture pattern) Two kinds were prepared for the picture pattern of a print sample, the 1st sheet considered as solid and the thing which made the set the kanji with which the sizes by black toner monochrome differ of 2cm angle size of yellow, a magenta, cyanogen, **** monochrome, a secondary color, and the 3rd color, and the 2nd sheet made it the 400 line(s)/inch halftone picture of black toner monochrome, and it outputted two sorts of samples by turns Although the middle imprint body surface potential of an immediately after [the secondary imprint of the print of the 1st sheet] had the surface potential nonuniformity according to the about [-110V] picture pattern from -80V After the optical irradiation with the optical irradiation electric discharge machine JK, the surface potential of a middle imprint object becomes almost uniform from -10V to -30V. In the 400 line(s)/inch halftone picture which is the following print sample, it became the picture which the concentration nonuniformity considered to be based on the form resistance fall under high-humidity/temperature and the bias of imprint electric field and spilling have generated.

[0078] (Example of change) Although the example of this invention was explained in full detail above, this invention can make various change within the limits of the summary of this invention which is not limited to the aforementioned example and indicated by the claim. The change example of this invention is illustrated below.

(H01) The middle imprint object used by this invention is usable also with the image formation equipment of the tandem type equipped with two or more image supports.

(H02) The secondary imprint machine T2 can be constituted with the contact roll which contacts back-up-roll T2a, secondary transfer roller T2b, and the aforementioned back-up-roll T2a.

(H03) Although the example using the middle imprint object of four layer structures which carried out film formation was shown at the order of a ground layer, a charge generating layer, and a charge transporting bed on the lowest layer front face which distributed carbon black in the aforementioned example Even when only the monolayer which has a photoconductivity for a middle imprint object is made two-layer [in_ which the photoconduction layer was formed on the ground layer front face which distributed carbon black etc.], in the same operation, it is stabilized and good quality of image can be obtained.

(H04) Although potential adjustment of the middle imprint object by optical irradiation of the aforementioned example is performed from the middle imprint body surface side, when a photoconductivity middle imprint object is a monolayer, or when the lowest layer is permeability also in

a double layer, it is possible to perform optical irradiation from a rear face.

[0079]

[Effect of the Invention] The image formation equipment of the above-mentioned this invention can do the following effect so.

(E01) By making small the potential difference of the picture section at the time of a secondary imprint (portion which imprints a toner), and the non-picture section (the portion which does not imprint a toner, background of a picture), the breadth to the non-picture section of imprint electric field can be prevented. Therefore, it can imprint with a good picture, without a toner picture scattering, even when form resistance, such as the bottom of high-humidity/temperature, falls.

(E02) The primary imprint of multiple times can be performed continuously, without primary imprint voltage impressed also in the photoconductivity middle imprint object which has the high resistance as a dielectric at the time of a primary imprint rising greatly. Therefore, when imprinting the primary toner image of a different color on a middle imprint object in piles, primary imprint power supplies of a low battery can perform a primary imprint good.

[Translation done.]

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PRIOR ART

[Description of the Prior Art] Once imprinting the primary toner image (developed image) formed on image supports, such as a photo conductor drum, on middle imprint objects other than an imprint form as the image formation method (the imprint method) in color picture formation equipments, such as an electrophotography copying machine, the method of imprinting the 2nd order to up to an imprint form anew, and obtaining a copy image is learned. And it is known that generating of gap of the poor multiplex imprint by many factors, such as thickness of the maintenance state of an imprint form and an imprint form and the front-face nature of a lumbus and an imprint form, and color registration can be suppressed by using this method. The following conventional technology (J01) is known as image formation equipment which used the aforementioned middle imprint object.

[0003] (J01) technical drawing 8 shown in drawing 8 -- a middle imprint object -- use -- it is explanatory drawing of the image formation equipment of the bottom former Image formation equipment U is equipped with the automatic manuscript transport device U1 and the main part U2 of image formation equipment (copying machine) which has platen glass PG which supports this in drawing 8 . The aforementioned automatic manuscript transport device U1 has the manuscript delivery tray TG2 on which the manuscript Gi with which two or more manuscripts Gi which it is going to copy are conveyed by passing through the copy position on the aforementioned platen glass PG (manuscript reading station) from the manuscript medium tray TG1 laid in piles and the manuscript medium tray TG1 is discharged. The aforementioned main part U2 of image formation equipment has UI (user interface), the exposure optical system A, etc. with which a user does alter operation of the operation command signals, such as a copy start. The reflected light from the manuscript (not shown) placed on platen glass PG with the manuscript or hand control by which platen glass PG conveyance is carried out by the aforementioned automatic manuscript transport device U2 is changed into the electrical signal of R (red), G (green), and B (blue) by CCD (solid state image pickup device) through the aforementioned exposure optical system A. installation performance specification (image-processing system) changes the electrical signal of Above RGB into the image data of K (black), Y (yellow), M (Magenta), and C (cyanogen), memorizes it temporarily, and outputs the aforementioned image data to the laser drive circuit DL to predetermined timing.

[0004] The front face of the image support (photo conductor drum) PR rotated in the arrow Ya direction is uniformly charged with the electrification vessel CR in the electrification field Q0, and passes through the latent-image formation position Q1, the development field Q2, and the primary imprint field Q3 one by one. ROS (latent-image write-in equipment) driven by the aforementioned laser drive circuit DL carries out an exposure scan in the aforementioned latent-image formation position Q1 by the laser beam L, and forms an electrostatic latent image in an image support PR front face. The electrostatic latent image corresponding to [when forming a full color picture] the picture of four colors of K (black), Y (yellow), M (Magenta), and C (cyanogen) is formed one by one, and when it is a monochrome picture, only the electrostatic latent image corresponding to K (black) picture is formed.

[0005] It rotates and the image support PR front face in which the aforementioned electrostatic latent image was formed passes through the development field Q imprint [2 or primary] field Q3 one by one.

The developer G of rotary system has the development counters GK, GY, GM, and GC of four colors of K (black), Y (yellow), M (Magenta), and C (cyanogen) which rotate one by one to the aforementioned development field Q2 with rotation of the axis of rotation GA. The development counters GK, GY, GM, and GC of each aforementioned color have the development roll GR which conveys a developer to the aforementioned development field Q2, and develop the electrostatic latent image on the image support PR which passes through the development field Q2 in the toner image Tn. 2 component developer which has a toner and a carrier as a developer is used, and the toner of negative-electrode electrification nature is used as a toner of yellow, a magenta, cyanogen, and black.

[0006] Under the aforementioned image support PR, the slide frame F1 (it displays by the two-dot chain line) is supported possible [slide movement to order (direction perpendicular to space)] with the slide rails SR and SR of a right-and-left couple. The belt frame F2 of the belt module BM is supported up and down by the slide frame F1 possible [rotation] at the circumference of hinge shaft F2a. The aforementioned belt module BM has two or more belt support rolls (Rd, Rt, Rw, Rf, T2a) supported possible [a rotation of the aforementioned middle imprint belt (belt-like middle imprint object) B], the primary transfer roller T1, and the aforementioned belt frame F2 which supports them. Two or more aforementioned belt support rolls (Rd, Rt, Rw, Rf, T2a) contain the belt driving roll Rd, a tension roll Rt, the walking roll Rw, the idler roll (free roll) Rf, and back-up-roll T2a.

[0007] The imprint voltage of the electrification polarity of a toner and reversed polarity is impressed by the power circuit E which Controller C controls, and the aforementioned primary imprint machine T1 imprints the primary toner image Tn of the aforementioned image support PR front face to the middle imprint belt B in the primary imprint field Q3. In the case of a full color picture, the primary toner image Tn of each color formed in an image support PR front face one by one is imprinted one by one by the middle imprint belt B front face in piles in the aforementioned primary imprint field Q3, and, finally, a full color multiplex toner image is formed on the middle imprint belt B. In forming a monochrome monochrome color picture, it uses only one development counter, and the primary monochrome toner image is imprinted on the middle imprint belt B. After a primary imprint, a remains toner is cleaned with the image support cleaner CLp, and an image support PR front face is discharged with the image support electric discharge vessel JR.

[0008] The secondary imprint slide frame Fs in which slide movement to order (direction perpendicular to space) is possible is supported removable to the main part of image formation equipment by the lower part of the aforementioned back-up-roll T2a with the slide rails SR and SR of a right-and-left couple. The secondary imprint rise-and-fall frame Ft of the secondary imprint unit Ut supported up and down by the aforementioned secondary imprint slide frame Fs possible [rotation] at the circumference of the hinge shaft Fta can be gone up and down between the evacuation positions which rose and which and descended. [positions] [use] The aforementioned secondary imprint unit Ut has secondary transfer roller T2b, the secondary transfer roller cleaner CL 3 and the roll support lever Lr, the sheet guide SG2 after an imprint, and the sheet conveyance belt BH and the aforementioned secondary imprint rise-and-fall frame Ft which supports them.

[0009] The aforementioned roll support lever Lr is a lever which supports the aforementioned secondary transfer roller T2b. In the state where the aforementioned secondary imprint unit Ut moved to the aforementioned operating position, it rotates to the circumference of the hinge shaft La by the motor which is not illustrated, and the aforementioned roll support lever Lr moves the aforementioned secondary transfer roller T2b between the positions in readiness distant from the secondary imprint position and the middle imprint belt B in contact with the aforementioned middle imprint belt B. The secondary imprint field Q4 is formed of the surface of action of aforementioned secondary transfer roller T2b and the aforementioned middle imprint belt B, and the secondary imprint machine T2 is constituted by metal electrode roll T2c which contacts aforementioned secondary transfer roller T2b, aforementioned back-up-roll T2a, and back-up-roll T2a.

[0010] To predetermined timing, it is taken out by the pick up roll Rp, and sells, one sheet dissociates at a time with Roll Rs, and record sheet S held in the medium tray TR1 is conveyed by the register roll Rr. Record sheet S conveyed by the aforementioned register roll Rr doubles timing with the multiplex toner

image or monochrome toner image imprinted [aforementioned] the 1st order moving to the secondary imprint field Q4, and is conveyed from the sheet guide SG1 before an imprint to the secondary imprint field Q4. In case record sheet S passes through the aforementioned secondary imprint field Q4, secondary imprint voltage of the electrification polarity of a toner and like-pole nature is impressed to electrode roll T2c of the secondary imprint machine T2 from the power circuit E which Controller C controls. The aforementioned secondary imprint machine T2 bundles up the color toner image imprinted in piles by the primary aforementioned middle imprint belt B in the aforementioned secondary imprint field, and imprints it the 2nd order to record sheet S. As for the middle imprint belt B after a secondary imprint, a remains toner is removed by the belt cleaner CLb. Moreover, as for the aforementioned secondary transfer roller T2b, a surface adhesion toner is recovered by the secondary transfer roller cleaner CL 3.

[0011] In addition, aforementioned secondary transfer roller T2b and the belt cleaner CLb are arranged free [a disjunction (isolation and contact)] to the middle imprint belt B, and they are being isolated from the middle imprint belt B until the primary non-established toner image of the last color is imprinted by the middle imprint belt B, when a color picture is formed. The aforementioned record sheet S by which the secondary toner image was imprinted is conveyed to the fixing field Q5 with the after [an imprint] sheet guide SG2, and the sheet conveyance belt BH, and in case it passes through the fixing field Q5, heating fixing of it is carried out by the fixing equipment F which has the fixing roll of the couple constituted by a heating roller Fh and the pressure roll Fp. Record sheet S fixed to the toner image is discharged by the record sheet ejection tray TR2. The sheet transport device SH is constituted by the element shown with the aforementioned signs Rp, Rs, Rr, SG1, SG2, and BH.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]

[Drawing 1] Drawing 1 is the whole image formation equipment explanatory drawing of the example 1 of this invention.

[Drawing 2] Drawing 2 is drawing showing the composition of the middle imprint belt currently used in the example 1 of the image formation equipment of this invention.

[Drawing 3] Drawing 3 is the block diagram of the control section of the aforementioned example 1.

[Drawing 4] Drawing 4 is the timing diagram of the primary imprint machine T1 of an example 1, the middle imprint object potential regulator K, the secondary imprint machine T2, and the optical irradiation electric discharge machine JK.

[Drawing 5] It is drawing showing the toner image in the case of drawing 5 using the photoconductivity middle imprint object B of high resistance of an example 1 (middle imprint belt), and imprinting a toner image on the middle imprint object B from the image support (photo conductor) PR, and the potential of the circumference. Drawing showing that potential (- potential) rises whenever it repeats a primary imprint in drawing in which drawing 5 A shows the potential on the image support PR, and drawing in which drawing 5 B shows the potential on the middle imprint object B, Since the difference of the picture potential of a middle imprint object B front face and non-picture potential became small, drawing and drawing 5 C which shows that the potential of a middle imprint body surface falls by exposing drawing 5 B' after the 4th primary imprint is drawing showing the state where the breadth to the non-picture section of secondary imprint electric field was lost.

[Drawing 6] Drawing 6 is explanatory drawing of the mechanism of the potential adjustment at the time of using corotron as a middle imprint object potential regulator. Drawing 6 A the direct current voltage impressed to corotron The picture section on a middle imprint belt, Explanatory drawing in the state where the potential of the picture section at the time of setting it as the middle potential of the non-picture section and the non-picture section changes, Drawing 6 B is drawing showing the potential state of the picture section after drawing and the drawing 6 C potential which show signs that the potential of the picture section and the non-picture section changes change, and the non-picture section, when corotron carries out corona discharge.

[Drawing 7] Drawing 7 is the timing diagram of the primary imprint machine T1 of an example 3, the middle imprint object potential regulator K, the secondary imprint machine T2, and the optical irradiation electric discharge machine JK.

[Drawing 8] Drawing 8 is explanatory drawing of the conventional image formation equipment which used the middle imprint object.

[Drawing 9] Drawing 9 uses a photoconductivity middle imprint object of high resistance like aforementioned Japanese Patent Application No. No. (publication-number -number official report) 123999 [ten to]. In drawing showing the toner image in the case of imprinting a toner image, and the potential of the circumference on a middle imprint object from an image support (photo conductor) Drawing in which drawing 9 A shows the potential on an image support, drawing in which drawing 9 B shows the potential on a middle imprint object, drawing in which drawing 9 B' shows the potential of a

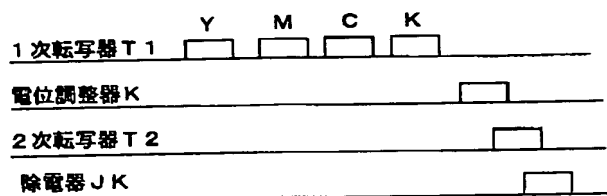
middle imprint body surface after the 4th primary imprint, and drawing 9 C are drawings showing secondary imprint electric field.

[Description of Notations]

B [-- Fixing equipment, JK / -- Optical irradiation electric discharge machine,] -- A middle imprint object, C7' -- Potential regulator control means, F K [-- Latent-image formation position,] -- A middle imprint object potential regulator, Q0 -- An electrification field, Q1 Q2 [-- A potential coordination area, Q7 / -- An electric discharge field, PR / -- An image support, S / -- The sheet for record, SH / -- A sheet transport device, T imprint / 1--primary / machine T imprint / 2--secondary / machine, TR1 / -- Medium tray.] -- A development field, Q imprint [3--primary] field, Q imprint [4--secondary] field, Q5 -- A fixing field, Q6

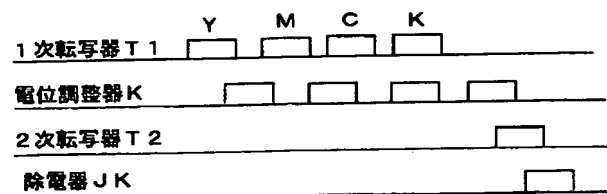
[Translation done.]

(実施例 1)
(実施例 2)

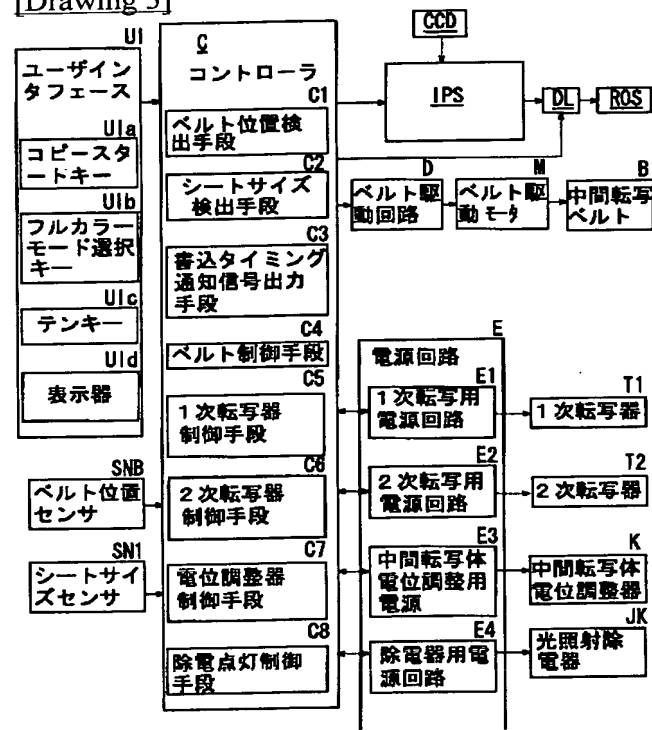


[Drawing 7]

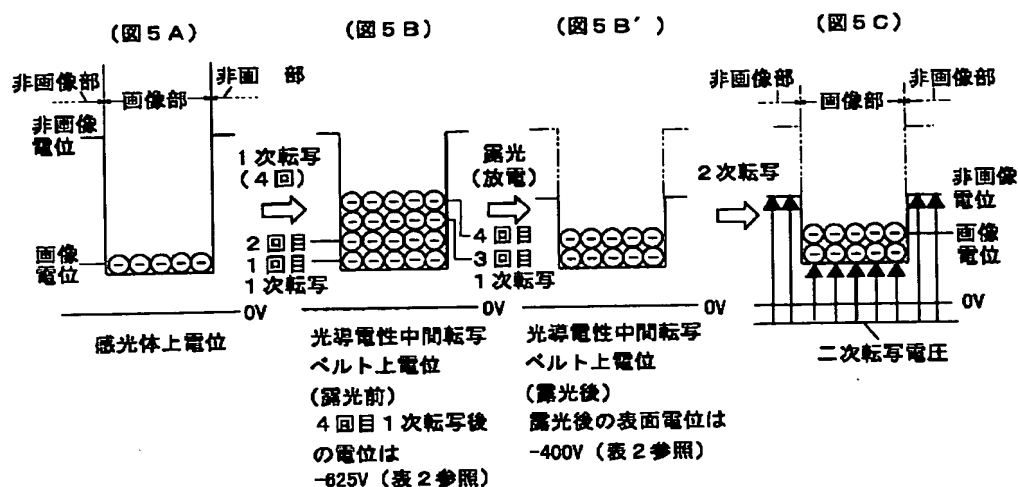
(実施例 3)
(実施例 4)



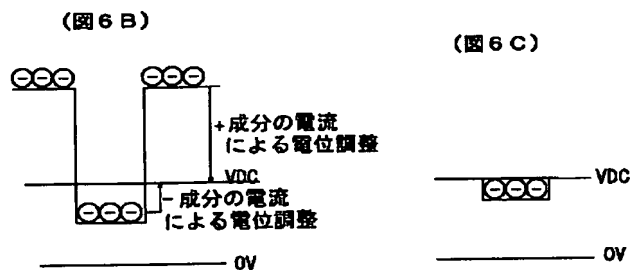
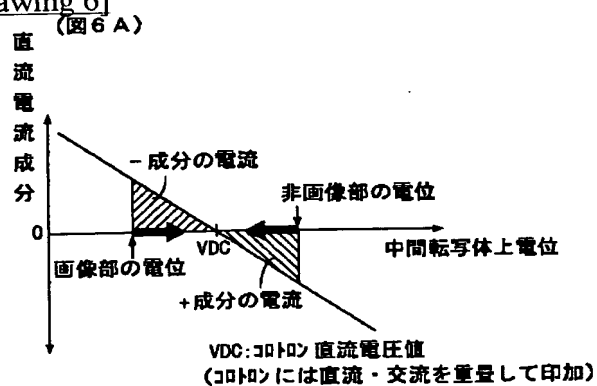
[Drawing 3]



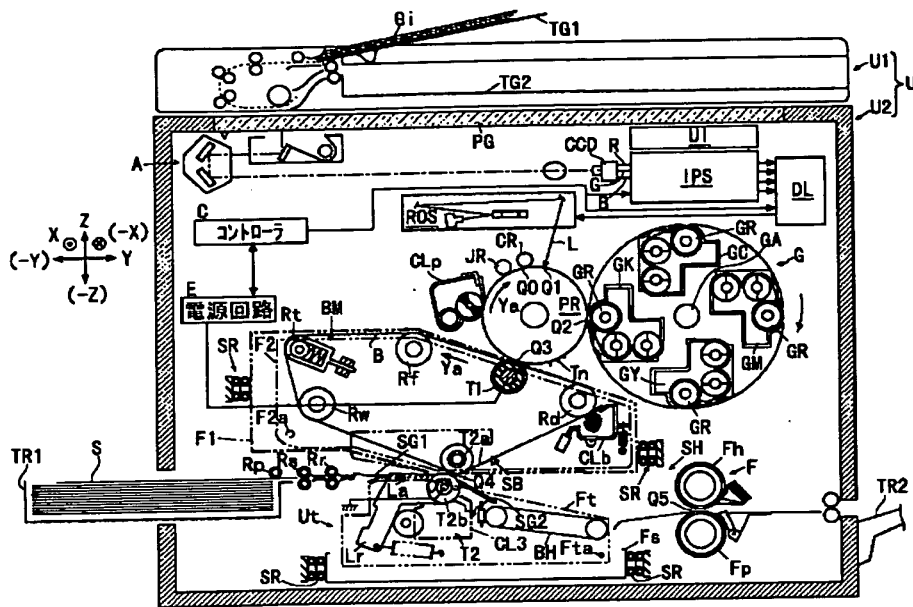
[Drawing 5]



[Drawing 6]



[Drawing 8]



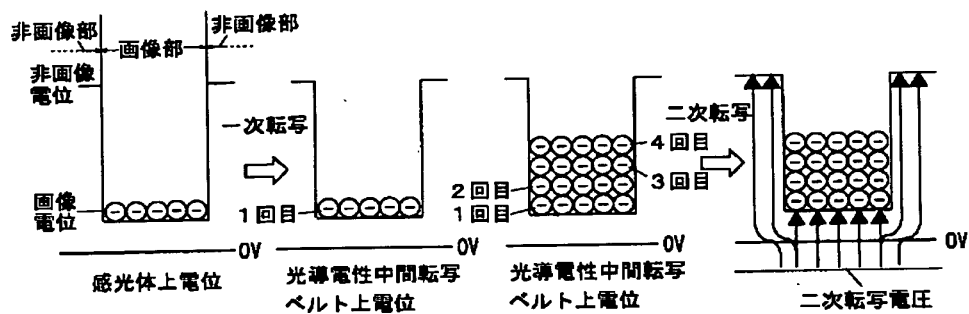
[Drawing 9]

(図 9 A)

(図 9 B)

(図 9 B')

(図 9 C)



[Translation done.]